Masterpact™ NT and NW Universal Power Circuit Breakers

Catalog
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Class 0613

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Section 1—Masterpact™ Circuit Breakers

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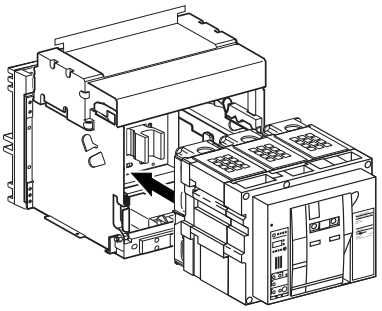
Introduction

800–1600 A Masterpact NT Drawout Circuit Breaker

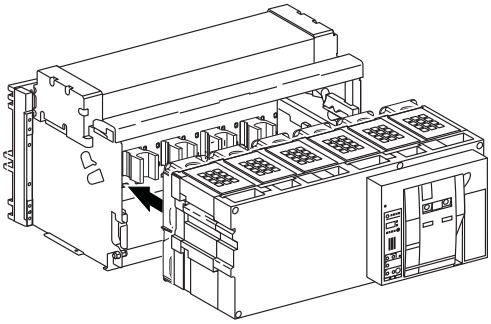
Masterpact NT/NW Universal Power Circuit Breakers are designed to protect electrical systems from damage caused by overloads, short circuits and equipment ground faults. All Masterpact circuit breakers are designed to open and close a circuit manually, and to open the circuit automatically at a predetermined overcurrent setting. Masterpact circuit breakers can also:

- Enhance coordination by their adjustability.
- Provide integral ground-fault protection for equipment.
- Provide high interrupting ratings and withstand ratings.
- Provide communications.
- Provide power monitoring.
- Provide protective relaying functions.
- Provide zone-selective interlocking (ZSI) which can reduce damage in the event of a fault.

Figure 1: Masterpact NW Drawout Circuit Breakers



800–3200 A Masterpact NW Drawout Circuit Breaker



4000–6300 A Masterpact NW Drawout Circuit Breaker

Codes and Standards

Masterpact circuit breakers are manufactured and tested in accordance with the following standards:

Low-Voltage Power Circuit Breaker	Insulated Case Circuit Breaker	IEC Rated Circuit Breaker	IEC Extreme Atmospheric Conditions
ANSI C37.13 ANSI C37.16 ANSI C37.17 ANSI C37.50 UL 1066 (cULus Listed) NEMA SG3	UL 489 (UL Listed) NEMA AB1 CSA C22.2 No. 5 NMX J-266-ANCE	IEC 60947-2 IEC 60947-3	IEC 68-2-1: Dry cold at –55°C IEC 68-2-2: Dry heat at +85°C IEC 68-2-30: Damp heat (temp. +55°C, rel. humidity 95%) IEC 68-2-52 Level 2: Salt mist

NOTE: Throughout this document, the phrase “ANSI® Certified” means the product meets the requirements of UL 1066 and ANSI C37. When “UL® Listed” appears, the product meets the requirements of UL 489.

The 800–2000 A ANSI Low Voltage Power Circuit Breakers type L1F and Insulated Case Circuit Breaker type LF are tested to show the arc flash hazard risk category as referenced by NFPA® 70E.

Circuit breakers should be applied according to guidelines detailed in the National Electrical Code® (NEC®) and other local wiring codes.

Masterpact circuit breakers are available in Square D™ or Schneider Electric™ brands.

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UL File Numbers:

- Masterpact NW: E161835 Vol. 2 Sec. 1
- Masterpact NT: E161835 Vol. 2 Sec. 2

Features and Benefits

High Ampere Interrupting Rating (AIR): ANSI Certified Masterpact NW circuit breakers have an interrupting rating of 200,000 A at 508 Vac without fuses.

High Short-Time Current Rating: Masterpact NW circuit breakers have exceptional short-time ratings—up to 100,000 A.

100% Rated Circuit Breaker: Masterpact circuit breakers are designed for continuous operation at 100% of their current rating.

Reverse Fed Circuit Breaker: Masterpact circuit breakers can be fed either from the top of the circuit breaker or from the bottom.

True Two-Step Stored Energy Mechanism: Masterpact circuit breakers are operated via a stored-energy mechanism which can be manually or motor charged. The closing time is less than five cycles. Closing and opening operations can be initiated by remote control or by push buttons on the circuit breaker front cover. An O–C–O cycle is possible without recharging.

Drawout or Fixed Mount, 3-Pole (3P) or 4-Pole (4P) Construction: ANSI Rated, UL Listed and IEC Rated Masterpact circuit breakers are available in drawout or fixed mounts, with either 3P or 4P construction.

Field-Installable Trip Units, Sensor Plugs and Accessories: Trip units, sensor plugs and most accessories are field installable with only the aid of a screwdriver and without adjusting the circuit breaker. The uniform design of the circuit breaker line allows most accessories to be common for the whole line.

Reinforced Insulation: Two insulation barriers separate the circuit breaker front from the current path.

Isolation Function by Positive Indication of Contact Status: The mechanical indicator is truly representative of the status of all the main contacts.

Segregated Compartment: Once the accessory cover has been removed to provide access to the accessory compartment, the main contacts remain fully isolated. Furthermore, interphase partitioning allows full insulation between each pole even if the accessory cover has been removed.

Front Connection of Secondary Circuits: All accessory terminals (ring terminals are available as an option) are located on a connecting block which is accessible from the front in the connected, test and disconnected positions. This is particularly useful for field inspection and modification.

Anti-Pumping Feature: All Masterpact NT and NW circuit breakers are designed with an anti-pumping feature that causes an opening order to always takes priority over a closing order. Specifically, if opening and closing orders occur simultaneously, the charged mechanism discharges without any movement of the main contacts keeping the circuit breaker in the open (OFF) position.

In the event that opening and closing orders are simultaneously maintained, the standard mechanism provides an anti-pumping function which continues to keep the main contacts in the open position.

In addition, after fault tripping or opening the circuit breaker intentionally (using the manual or electrical controls and with the closing coil continuously energized) the circuit breaker cannot be closed until the power supply to the closing coil is discontinued and then reactivated.

NOTE: When the automatic reset after fault trip (RAR) option is installed, the automatic control system must take into account the information supplied by the circuit breaker before issuing a new closing order or before blocking the circuit breaker in the open position. Information on the type of fault, e.g. overload, short-circuit or ground fault.

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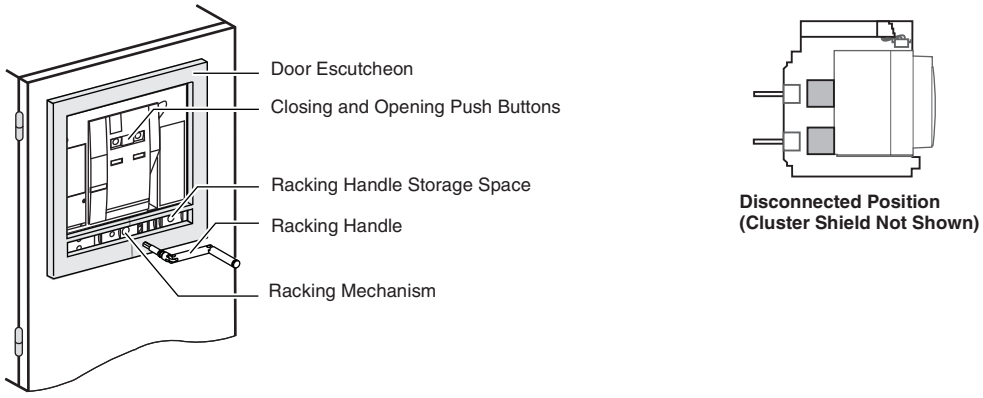
Disconnection Through the Front Door: The racking handle and racking mechanism are accessible through the front door cutout. Disconnecting the circuit breaker is possible without opening the door and exposing live parts.

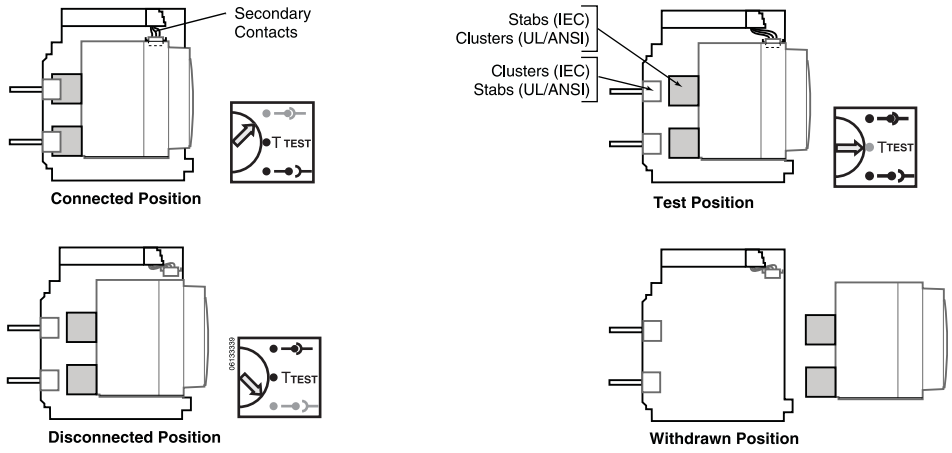
Figure 2: Racking Handle and Mechanism



Drawout Mechanism: The drawout assembly mechanism allows the circuit breaker to be racked in four positions (connected, test, disconnected, or withdrawn), as shown in the figure below.

NOTE: For UL/ANSI circuit breakers, the clusters are mounted on the circuit breaker; for IEC circuit breakers, the clusters are mounted on the cradle.

Figure 3: Racking Positions (Cluster Shield Not Shown)



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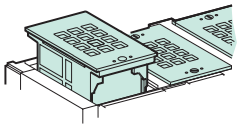
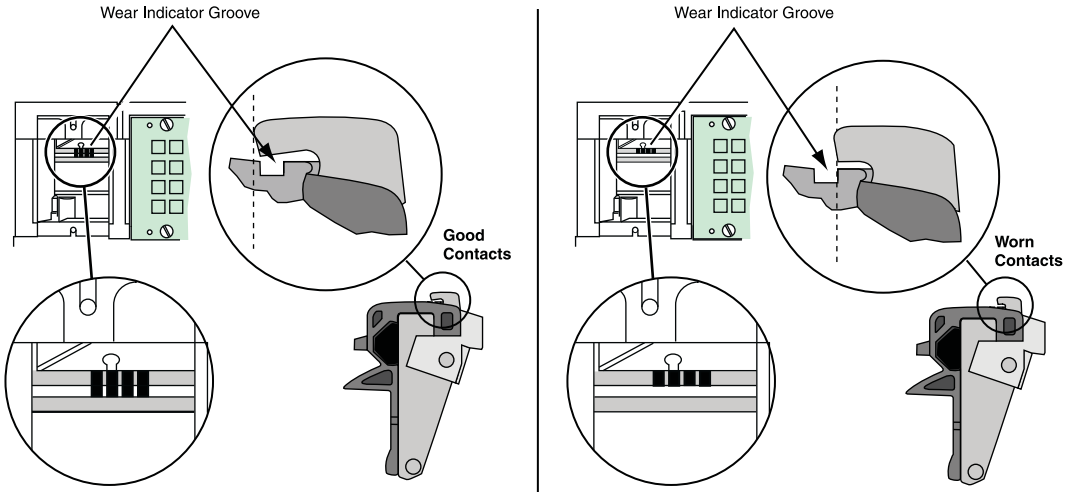
Reduced Maintenance: Under normal operating conditions, the circuit breaker does not require maintenance. However, if maintenance or inspection is necessary, the arc chambers are easily removed so you may visually inspect the contacts and wear indicator groove (see the figure below for how wear is indicated). The operation counter can also indicate when inspections and possible maintenance should be done. The life of the circuit breaker may be extended by replacing the arc chamber and spring-charging motor and/or replacing the main contact assembly of ANSI Certified circuit breakers.



Arc Chamber

Figure 4: Contact Wear Indicators



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Operating Conditions

See bulletin 0613IB1202, available in the Schneider Electric technical library, for information on normal and adverse operating conditions.

Ambient Temperature:

Masterpact circuit breakers can operate under the following temperature conditions:

- The electrical and mechanical characteristics are stipulated for an ambient temperature between -13°F (-25°C) and 158°F (70°C).
  Mechanical closing of the circuit breaker (by pushbutton) is possible down to -31°F (-35°C)
- At altitudes +13,000 ft. (3900 m).

Masterpact circuit breakers have been tested for operation in industrial atmospheres. It is recommended that the equipment be cooled or heated to the proper operating temperature and kept free of excessive vibration and dust. Operation at temperatures above 104°F (40°C) may require derating or overbussing the circuit breaker. See the appropriate instruction bulletin and page 17 of this catalog for additional information.

Storage Temperature

Circuit breakers with trip units without LCD displays may be stored in the original packaging at temperatures between -40°F (-40°C) and 185°F (85°C).

For circuit breakers with trip units with LCD displays, this range is -13°F (-25°C) to 185°F (85°C).

Altitude:

Masterpact circuit breakers are suitable for use at altitudes of 13,000 ft. (3900 m) and below. See Table 15 on page 17 for Altitude correction factors.

Vibration:

Masterpact circuit breakers meet IEC 60068-2-6 Standards for vibration.

- 2 to 13.2 Hz and amplitude 0.039 in. (1 mm)
- 13.2 to 100 Hz constant acceleration 0.024 oz. (0.7 g)

Humidity:

Masterpact circuit breakers have been tested to the following:

- IEC68-2-30—damp heat (temperature +55°C and relative humidity of 95%)
- IEC 68-2-52 level 2—salt mist

The materials used in Masterpact NT and NW circuit breakers will not support the growth of fungus and mold.

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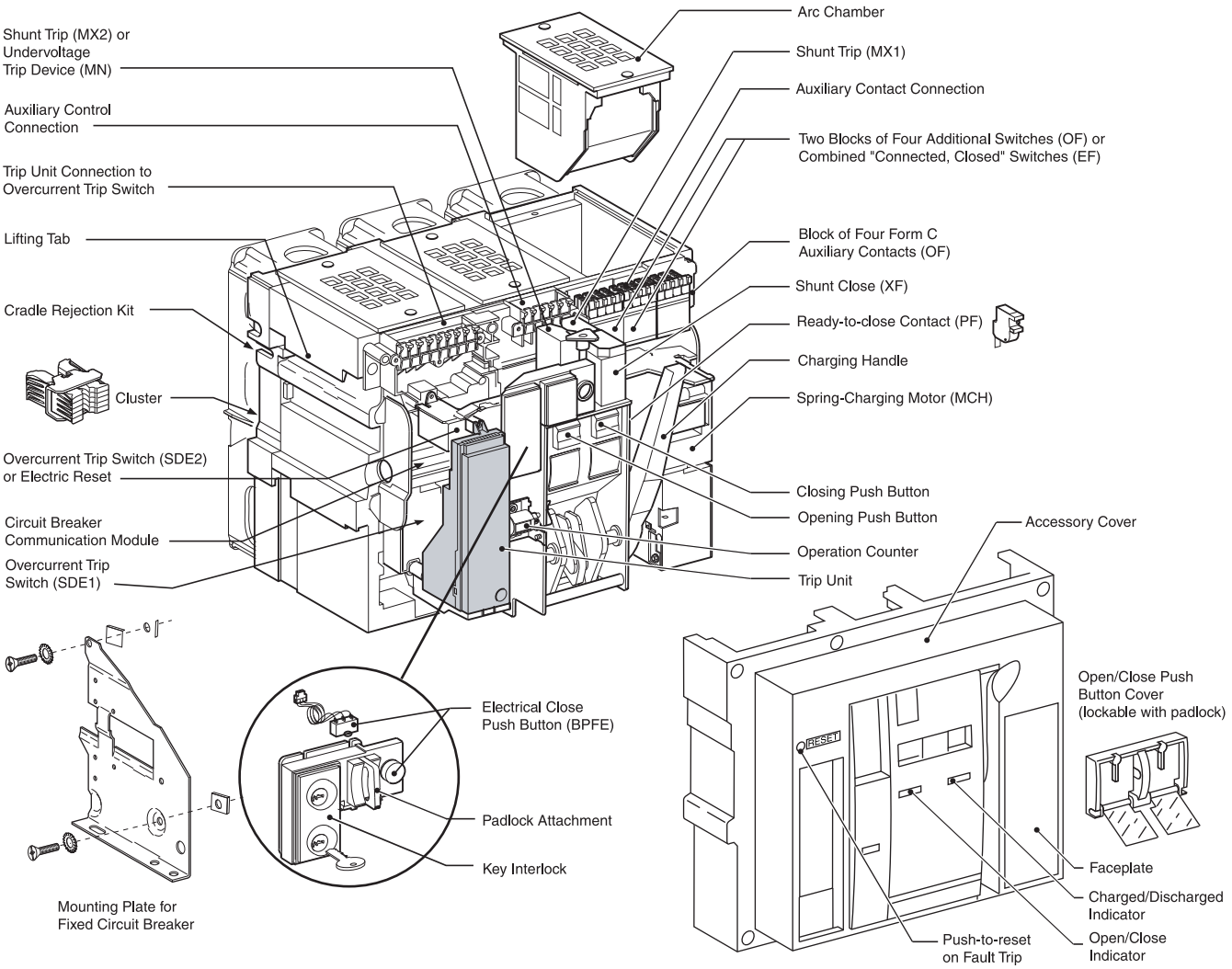
Masterpact NW Circuit Breaker Design

NOTE: For UL Listed and ANSI Certified circuit breakers, the clusters are mounted on the circuit breaker; for IEC Rated circuit breakers, the clusters are mounted on the cradle.



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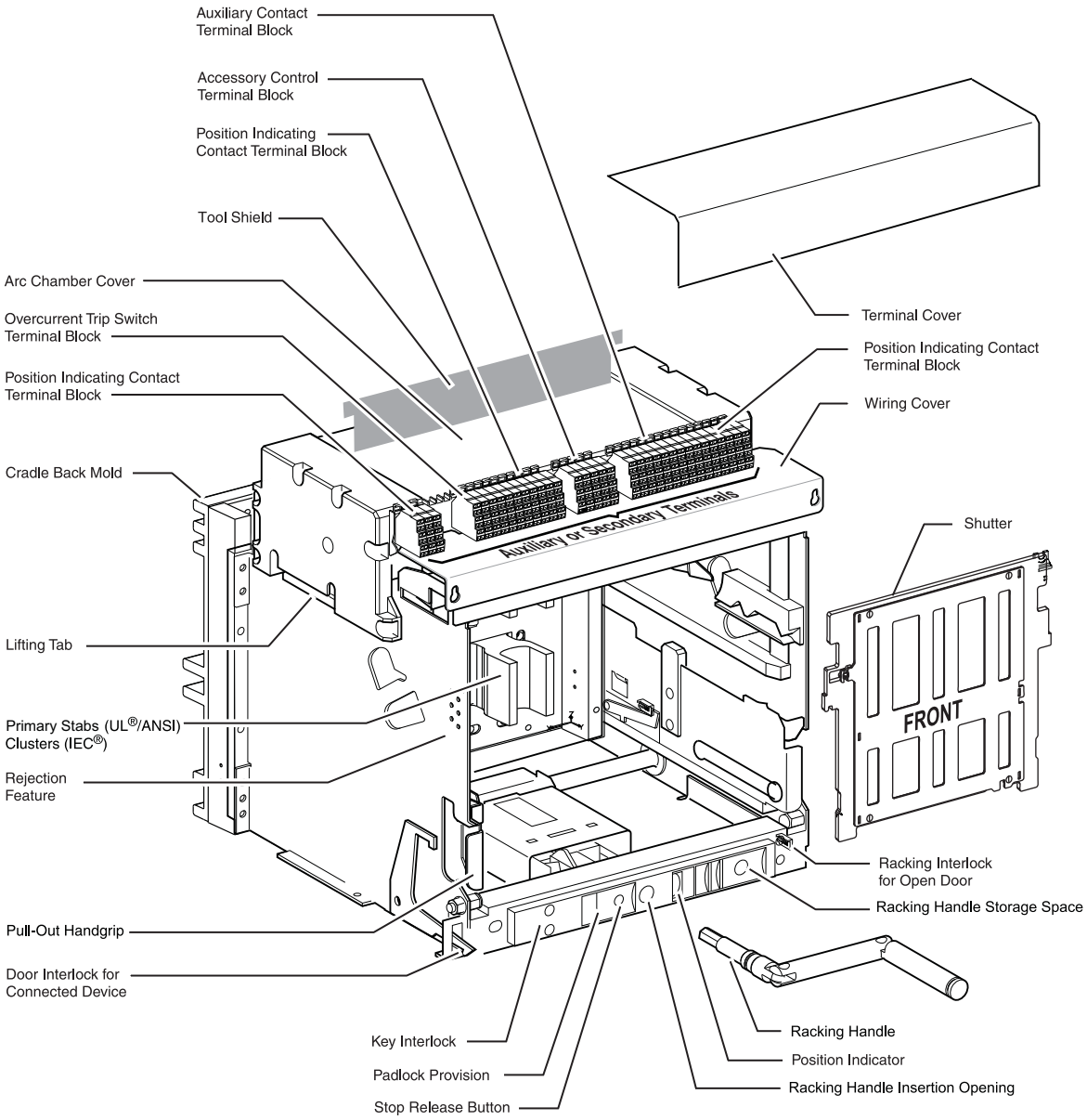
Masterpact NW Cradle Design



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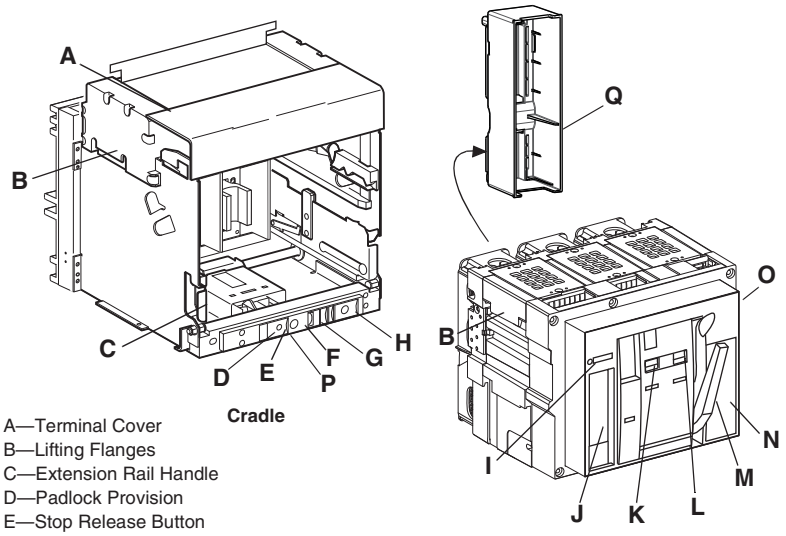
Masterpact NW with ArcBlok™ Technology

The Masterpact NW low-voltage power circuit breaker and insulated case circuit breaker are available with ArcBlok technology designed to mount in an ArcBlok drawout cradle.

The Masterpact NW with ArcBlok technology interfaces with the ArcBlok cradle to prevent arcing events by enclosing the phases at the primary connection of the cradle. If for any reason an arcing event happens, with the separation between phase to phase and phase to ground, the arc is extinguished in less than 12 ms to reduce arc flash energy.

The Masterpact NW with ArcBlok technology is tested as part of Arc Resistant Equipment to ANSI C37.20.7.

Figure 5: Masterpact NW Circuit Breaker and Cradle with ArcBlok Technology



Cradle

Drawout Circuit Breaker

A—Terminal Cover
B—Lifting Flanges
C—Extension Rail Handle
D—Padlock Provision
E—Stop Release Button
F—Racking Handle Insertion Opening
G—Position Indicator
H—Racking Handle Storage Space
I—Fault Trip Reset Button
J—Trip Unit
K—Push to Open Button
L—Push to Close Button
M—Charging Handle
N—Faceplate
O—Accessory Cover
P—Cradle Date Code
Q—ArcBlok Shield
(rotated for clarity)

Racking Handle

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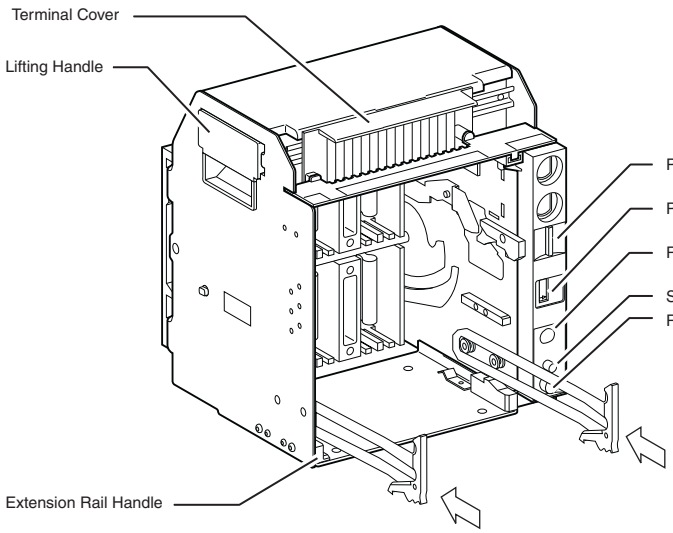
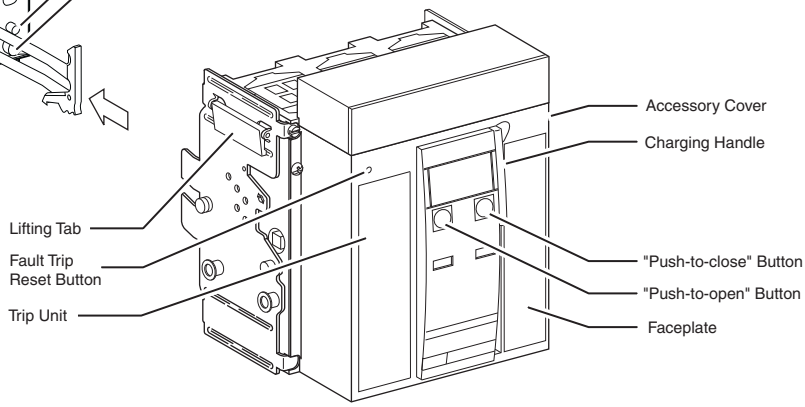
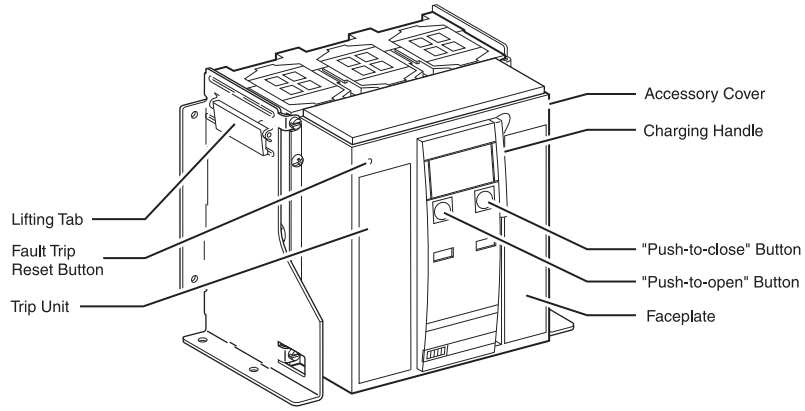
Masterpact NT Circuit Breaker and Cradle Design



NT Cradle



NT Drawout Circuit Breaker



Fixed Circuit Breaker

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Ratings

Table 1: Ratings for ANSI C37 Certified Masterpact NW Circuit Breakers

Frame Rating		800/1600 A						2000 A					3200/4000 A[1]				4000/5000/6000 A[2]		
Interrupting Rating Code		N1	H1	H2	H3	L1[3, 4]	L1F[4]	H1	H2	H3	L1[3, 4]	L1F[4]	H1	H2	H3	L1[3, 4]	H2	H3	L1[3, 4]
Interrupting Current (kAIR)	254 Vac 50/60 Hz	42	65	85	100	200	200	65	85	100	200	200	65	85	100	200	85	100	200
	508 Vac 50/60 Hz	42	65	85	100	200	200	65	85	100	200	200	65	85	100	200	85	100	200
	635 Vac 50/60 Hz	42	65	85	85	130	130	65	85	85	130	130	65	85	85	130	85	85	130
Short-Time Withstand Current (kA)	Vac 50/60 Hz, 0.5 s	42	65	85	85	30	22	65	85	85	30	22	65	85	85	100	85	85	100
Built In Instantaneous Override (Peak kA ±10%)		—[5]	—[5]	—[5]	190	80[5]	55	—	—	190	80	55	—	—	190	270	—	—	270
Close and Latch Ratings (Peak kA)	Vac 50/60 Hz	90	150	90	90	55	50	150	90	90	55	50	150	90	90	90	170	170	90
Tested to show arc flash hazard risk category as referenced by NFPA70E		—	—	—	—	—	Yes	—	—	—	—	Yes	—	—	—	—	—	—	—
Breaking Time		25 to 30 ms (with no intentional delay) 9 ms for L1 and L1F																	
Closing Time		70 ms																	
Sensor Rating		100–800 A 800–1600 A						1000–2000 A					1600–4000 A				2000–4000 A 2500–5000 A 3000–6000 A		
Endurance Rating (C/O Cycles) (with no maintenance)	Mechanical	12,500						10,000					10,000			5000	5000		
	Electrical	2800						1000					1000			1000	1000		

1 4000 A standard width circuit breaker is not available in L1 interrupting rating code or drawout construction.

2 ArcBlok circuit breakers are available only to 5000 A.

3 Interrupting ratings (kAIR) at 50 Hz: 200 kA (254 Vac), 150 kA (508 Vac), 100 kA (635 Vac).

4 The interrupting ratings L1 and L1F are available only in 3P, drawout construction.

5 55 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.

Table 2: Ratings for ANSI C37 Certified Masterpact NW Non-Automatic Switches

Frame Rating		800 A	1600 A	2000 A	3200 A	4000 A	5000 A
Withstand Rating Code		HA	HA	HA	HA	HA	HA
Breaking Capacity with External Relay (kA), 50/60 Hz	254 Vac	65	65	65	65	85	85
	508 Vac	65	65	65	65	85	85
	635 Vac	65	65	65	65	85	85
Short-Time Withstand Current (kA) Vac 50/60 Hz, 0.5 s		65	65	65	65	85	85

Table 3: Ratings for ANSI C37 Certified Masterpact NW Automatic Switches

Frame Rating		800 A		1600 A		2000 A		3200 A		4000 A[1]		5000 A	
Withstand Rating Code		HF	HC	HF	HC	HF	HC	HF	HC	HF	HC	HF	HC
Breaking Capacity with External Relay (kA), 50/60 Hz	254 Vac	100	200	100	200	100	200	100	200	100	200	100	200
	508 Vac	100	200	100	200	100	200	100	200	100	200	100	200
	635 Vac	85	130	85	130	85	130	85	130	85	130	85	130
Short-Time Withstand Current (kA) 50/60 Hz, 1.5 s		85	30	85	30	85	30	85	100	85	100	85	100

1 4000 A standard width automatic switch is not available in HC withstand rating code or drawout construction.

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Table 4: Ratings for UL 489 Listed Masterpact NW Circuit Breakers

Frame Rating		800/1200/1600/2000 A				2500/3000 A		4000/5000/6000 A	
Interrupting Rating Code		N	H	L	LF	H	L	H	L
Interrupting Current (kAIR)	240 Vac 50/60 Hz	65	100	200	200	100	200	100	200
	480 Vac 50/60 Hz	65	100	150	150	100	150	100	150
	600 Vac 50/60 Hz	50	85	100	100	85	100	85	100
Short-Time Withstand Current (kA)	Vac 50/60 Hz, 0.5 s	42[1]	65[1]	30[1, 2]	22	65	65	85	100
Built-In Instantaneous Override (Peak kA ±10%)		90	90	80[3, 4]	55	150	150	170	170
Close and Latch Ratings (Peak kA)	Vac 50/60 Hz	90	90	55[5]	50	90	90	90	90
Tested to show arc flash hazard risk category as referenced by NFPA70E		—	—	—	Yes	—	—	—	—
Breaking Time		25 to 30 ms (with no intentional delay) 9 ms for L and LF							
Closing Time		70 ms							
Sensor Rating		100–250 A / 400–800 A / 600–1200 A / 800–1600 A / 1000–2000 A				1200–2500 A / 1600–3000 A		2000–4000 A / 2500–5000 A / 3000–6000 A	
Endurance Rating (C/O Cycles)	Mechanical	12,500[6]	12,500[6]	12,500[6]	12,500[6]	10,000	10,000	5000	5000
(with no maintenance)	Electrical	2800[6]	2800[6]	2800[6]	2800[6]	1000	1000	1000	1000

1 24 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.

2 65 kA for 2000 A.

3 55 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.

4 150 kA for 200 A sensor.

5 90 kA for 2000 A.

6 The endurance rating for 2000 A, N/H/L/LF is 10,000 for mechanical and 1000 for electrical.

Table 5: Ratings for UL 489 Listed Masterpact NW Automatic Switches

Frame Rating		800 A		1200 A		1600 A		2000 A		2500 A		3000 A		4000 A		5000 A		6000 A	
Withstand Rating Code		HF	HB	HF	HB	HF	HB	HF	HB	HF	HB	HF	HB	HF	HB	HF	HB	HF	HB
Withstand Ratings[1] (kA) Vac, 50/60 Hz	240	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200	100	200
	480	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150	100	150
	600	85	100	85	100	85	100	85	100	85	100	85	100	85	100	85	100	85	100
Instantaneous Override (Peak kA)		90	80	90	50	90	80	90	80	150	150	150	150	170	170	170	170	170	170

1 The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

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Table 6: Ratings for IEC 60947-2 Rated Masterpact NW Circuit Breakers

Frame Rating			800/1000/1250/1600 A					2000 A						2500/3200/4000 A				4000B/5000/6300 A	
Interrupting Rating Code			N1	H1	H2	L1	H10	N1	H1	H2	H3	L1	H10	H1	H2	H3	H10	H1	H2
Ultimate Breaking Capacity (kA) 50/60 Hz	I_{cu}	220/415 Vac	42	65	100	150	—	42	65	100	150	150	—	65	100	150	—	100	150
		440 Vac	42	65	100	150	—	42	65	100	150	150	—	65	100	150	—	100	150
		525 Vac	42	65	85	130	—	42	65	85	130	130	—	65	85	130	—	100	130
		690 Vac	42	65	85	100	—	42	65	85	100	100	—	65	85	100	—	100	100
		1150 Vac	—	—	—	—	50	—	—	—	—	—	50	—	—	—	50	—	—
Service Breaking Capacity	I_{cs}	%Icu	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100%	100%
Short-Time Withstand Current (kA)	I_{cw}	Vac 50/60 Hz, 1 s	42	65	85	30	50	42	65	85	65	30	50	65	85	65	50	100	100
		Vac 50/60 Hz, 3 s	22	36	50	30	50	22	36	75	65	30	50	65	75	65	50	100	100
Built-In Instantaneous Override (Peak kA ±10%)			—	—	190[1]	80[1]	—	—	—	190	150	80	—	—	190	150	—	—	117
Rated making Current (Peak kA) 50/60 Hz	I_{cm}	220/415 Vac	88	143	220	330	—	88	88	220	330	330	—	143	220	330	—	220	330
		440 Vac	88	143	220	330	—	88	88	220	330	330	—	143	220	330	—	220	330
		525 Vac	88	143	187	286	—	88	88	187	286	286	—	143	189	286	—	187	286
		690 Vac	88	143	187	220	—	88	88	187	220	220	—	143	189	220	—	187	220
		1150 Vac	—	—	—	—	105	—	—	—	—	—	105	—	—	—	105	—	—
Break Time		ms	25					25						25				25	
Closing Time		ms	< 70					< 70						< 70				< 80	
Endurance Rating (with no maint.) C/O Cycles x 1000		Mechanical	12.5					10						10				5	
		Electrical 440 V	10	10	10	3	—	8	8	8	3	3	—	5	5	1.25	—	1.5	1.5
		Electrical 1150 V	—	—	—	—	0.5	—	—	—	—	—	0.5	—	—	—	0.5	—	—

[1] 55 kA for 800 A circuit breaker frame with 100 A or 250 A sensor.

Table 7: Ratings for IEC 60947-3 Rated Masterpact NW Switches

Frame Rating			800/1000/1250/1600 A				2000 A			2500/3200/4000 A			4000B/5000/6300 A
Withstand Rating Code[1]			NA	HA	HF	HA10	HA	HF	HA10	HA	HF	HA10	HA
Rated Making Current (Peak kA)	I_{cm}	220/415 Vac, 50/60 Hz	88	105	187	—	105	187	—	121	189	—	187
		440 Vac, 50/60 Hz	88	105	187	—	105	187	—	121	189	—	187
		500/690 Vac, 50/60 Hz	88	105	187	—	105	187	—	121	189	—	187
		1150 Vac, 50/60 Hz	—	—	—	105	—	—	105	121	—	105	—
Short-Time Withstand Current (kA)	I_{cw}	Vac 50/60 Hz, 1 s	42	50	85	50	50	85	50	50	85	50	85
Ultimate Breaking Capacity (with external protection relay) (kA)	I_{cu}	Maximum Delay 350 ms	42	50	85	50	50	85	50	50	85	50	85

[1] NA, HA, and HA10 are non-automatic switches; HF is an automatic switch.

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Table 8: Ratings for ANSI C37 Certified Masterpact NT Circuit Breakers

Frame Rating		800 A
Interrupting Rating Code		N1
Interrupting Current (kAIR)	254 Vac 60 Hz	42
	508 Vac 60 Hz	42
	635 Vac 60 Hz	N/A
Short-Time Withstand Current (kA)	ac 60 Hz, 0.5 s	42
Built-In Instantaneous Override (Peak kA ±10%)		—
Close and Latch Ratings (Peak kA)	ac 60 Hz	90
Tested to show arc flash hazard risk category as referenced by NFPA70E		—
Breaking Time		25 to 30 ms (with no intentional time delay)
Closing Time		< 50 ms
Sensor Rating		100 to 250 A / 400 to 800 A
Endurance Rating (C/O Cycles)	Mechanical	12,500
(with no maintenance)	Electrical	2800

Table 9: Ratings for ANSI C37 Certified Masterpact NT Non-Automatic Switches

Frame Rating		800 A
Withstand Rating Code		NA
Short-Time Withstand Current Rating (kA)	Vac 50/60 Hz, 0.5 s	42
Breaking Capacity (with external protection relay) (kA)	254/508/635 Vac, 60 Hz	42/42/NA

Table 10: Ratings for UL 489 Listed Masterpact NT Circuit Breakers

Frame Rating		800 A					1200 A					1600 A[1]			
Interrupting Rating Code		N	H	L1	L	LF	N	H	L1	L	LF	N	H	L1	L
Interrupting Current (kAIR)	240 Vac, 60 Hz	50	65	100	200	200	50	65	100	200	200	50	65	100	200
	480 Vac, 60 Hz	50	50	65	100	100	50	50	65	100	100	50	50	65	100
	600 Vac, 60 Hz	35	50	N/A	N/A	N/A	35	50	N/A	N/A	N/A	35	50	N/A	N/A
Short-Time Withstand Current Rating (kA)	Vac 60 Hz, 0.5 s	35	35	10	10	10	35	35	10	10	10	35	35	10	10
Built-In Instantaneous Override (Peak kA ±10%)		90	90	22	22	22	90	90	22	22	22	90	90	22	22
Close and Latch Ratings (Peak kA)	Vac 60 Hz	55	55	22	22	22	55	55	22	22	22	55	55	22	22
Tested to show arc flash hazard risk category as referenced by NFPA70E		—	—	—	—	Yes	—	—	—	—	Yes	—	—	—	—
Breaking Time		25 to 30 ms (with no intentional time delay) 9 ms for L and LF													
Closing Time		< 50 ms													
Sensor Rating		100–250 A / 400–800 A					600–1200 A					800–1600 A			
Endurance Rating (C/O Cycles) (with no maintenance)	Mechanical	12,500													
	Electrical	2800													

[1] Fixed-mounted only. 1600 A UL489 drawout circuit breakers are not available.

Table 11: Ratings for UL 489 Listed Masterpact NT Automatic Switches

Frame Rating		800 A		1200 A		1600 A	
Withstand Rating Code		HF	HB	HF	HB	HF	HB
Withstand Rating[1] (kA) Vac, 50/60 Hz	240	65	200	65	200	65	200
	480	50	100	50	100	50	100
	600	50	NA	50	NA	50	NA
Instantaneous Override (Peak kA)		90	22	90	22	90	22

[1] The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

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Table 12: Ratings for IEC 60947-2 Rated Masterpact NT Circuit Breakers

Frame Rating			800/1000 A			1250/1600 A	
Interrupting Rating Code			H1	H2	L1	H1	H2
Ultimate Breaking Capacity (kA)	I_{cu}	220/415 Vac, 50/60 Hz	42	50	150	42	50
		440 Vac, 50/60 Hz	42	50	130	42	50
		525 Vac, 50/60 Hz	42	42	100	42	42
		690 Vac, 50/60 Hz	42	42	25	42	42
		1000 Vac, 50/60 Hz	—	—	—	—	—
Service Breaking Capacity (kA)	I_{cs}	$\%I_{cu}$	100%	100%	100%	100%	100%
Short-Time Withstand Current (kA)	I_{cw}	Vac 50/60 Hz, 1 s	42	42	10 x I_n[1]	42	36
Built-In Instantaneous Override (kA ±10%)			—	90	10[2]	—	—
Rated Making Capacity (Peak kA)	I_{cm}	220/415 Vac, 50/60 Hz	88	105	330	88	105
		440 Vac, 50/60 Hz	88	105	286	88	105
		525 Vac, 50/60 Hz	88	88	220	88	88
		690 Vac, 50/60 Hz	88	88	52	88	88
		1000 Vac, 50/60 Hz	—	—	—	—	—
Break Time		ms	25	25	9	25	25
Closing Time		ms	50	50	50	50	50
Endurance Rating (C/O cycles) (with no maintenance)		Mechanical	12,500	12,500	12,500	12,500	12,500
		Electrical 440 V	6000	6000	3000	6000[3]	6000[3]
		Electrical 1000 V	—	—	—	—	—

1 For Icw, 10 kA is for 0.5 s.

2 SELLIM system.

3 1600 A at 690 V is 3000 electrical operations.

Table 13: Ratings for IEC 60947-3 Rated Non-Automatic Masterpact NT Switches

Frame Rating			800/1000 A	1250/1600 A
Withstand Rating Code			HA	HA
Rated Making Capacity (Peak kA)	I_{cm}	220/415 Vac, 50/60 Hz	75	75
		440 Vac, 50/60 Hz	75	75
		500/690 Vac, 50/60 Hz	75	75
		1000 Vac, 50/60 Hz	—	—
Short-Time Withstand Current (kA)	I_{cw}	Vac 50/60 Hz, 0.5 s	36	36
Breaking Capacity (kA at 690 Vac) (with external protection relay)	I_{cu}	maximum delay 350 ms	36	36

Correction Factors

Table 14: Temperature Correction Factors per ANSI C37.20.1 par. 7.4.2

	Maximum Ambient Temperature										
°F	140	122	104	86	77	68	50	32	14	–4	–22
°C	60	50	40	30	25	20	10	0	–10	–20	–30
Current	0.83	0.92	1.00	1.07	1.11	1.14	1.21	1.27	1.33	1.39	1.44

Table 15: Altitude Correction Factors per ANSI C37.20.1 par. 7.1.4.1 (Table 10)

	< 6600 ft. (2000 m)	8500 ft (2600 m)	13,000 ft. (3900 m)
Voltage	1.00	0.95	0.80
Current	1.00	0.99	0.96

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Shipping Weights

Table 16: Shipping Weights for UL Listed/ANSI Certified Masterpact NW Circuit Breakers

Circuit Breaker Rating (A)	Circuit Breaker[1] (lb/kg)		Cradle (lb/kg)		Connector Type and Weight (lb/kg)			Pallet (lb/kg)	Total Weight (lb/kg)	
	3P	4P	3P	4P	Type	3P	4P		3P	4P
800	109/50	142/65	97/44	116/53	FCF	42/19	55/25	17/8	265/121	320/151
1600					FCT	84/38	109/50	17/8	307/140	384/176
2000					RCTH or RCTV	17/8	22/10	17/8	240/110	297/136
2500	127/58	165/75	124/57	149/68	FCT	80/36	104/47	17/8	348/159	435/198
3000					RCTH or RCTV	26/12	34/15	17/8	294/135	365/166
2000 (L1, L1F)	127/58	165/75	124/57	149/68	RCOV (standard	100/46	130/59	17/8	368/169	461/210
3200 (H1, H2, H3)					RCOV (ArcBlok)	153/69	NA		421/191	NA
4000 W-Frame (H1, H2, H3)					RCOV (special)	115/52	145/66		259/118	327/149
3200 (L1)	227/103	295/134	278/126	334/152	FCF	84/38	109/50	39/18	628/285	777/354
4000					FCT	168/77	218/99	39/18	712/324	886/403
					RCTH or RCTV	52/24	68/31	39/18	596/271	736/335
5000	227/103	295/134	278/126	334/152	FCT	168/77	218/99	39/18	712/324	886/403
					RCTH or RCTV	52/24	68/31	39/18	596/271	736/335
6000	227/103	295/134	278/126	334/152	RCTH or RCTV	396/180	528/240	39/18	940/427	1196/544

1 Fixed circuit breaker weight = total weight – cradle weight.

Table 17: Shipping Weights for IEC 60947-2 Rated Masterpact NW Circuit Breakers

Circuit Breaker Rating (A)	Circuit Breaker[1] (lb/kg)		Cradle (lb/kg)		Connector Type and Weight (lb/kg)			Pallet (lb/kg)	Total Weight (lb/kg)	
	3P	4P	3P	4P	Type	3P	4P		3P	4P
800	109/50	132/60	97/44	116/53	FCF	42/19	55/25	17/8	265/121	320/145
1000, 1250, 1600, 2000					RCTH or RCTV	17/8	22/10	17/8	240/110	287/131
2500	127/58	165/75	124/57	149/68	FCF	42/19	55/25	17/8	310/142	386/175
3200					RCTH or RCTV	17/8	22/10	17/8	285/131	353/161
4000	127/58	165/75	124/57	149/68	RCTH or RCTV	42/19	55/25	17/8	310/142	386/176
4000b, 5000, 6300	227/103	295/134	278/126	334/152	RCTH or RCTV	52/24	68/31	39/18	596/271	736/335

1 Fixed circuit breaker weight = total weight – cradle weight.

Table 18: Shipping Weights for UL Listed/ANSI Certified Masterpact NT Circuit Breakers

Circuit Breaker Rating (A)	Circuit Breaker[1] (lb/kg)		Cradle (lb/kg)		Connector Type and Weight (lb/kg)			Pallet (lb/kg)	Total Weight (lb/kg)	
	3P	4P	3P	4P	Type	3P	4P		3P	4P
800	40/18	52/24	36/16	43/20	FCF	15/7	20/9	10/5	101/46	125/58
1200					RCTH or RCTV	6/3	8/4	10/5	92/42	113/53
1600[2]	40/18	52/24	N/A	N/A	RCTV	18/8	20/9	10/5	68/31	82/38

1 Fixed circuit breaker weight = total weight – cradle weight.

2 Fixed circuit breaker only.

Table 19: Shipping Weights for IEC 60947-2 Rated Masterpact NT Circuit Breakers

Circuit Breaker Rating (A)	Circuit Breaker[1] (lb/kg)		Cradle (lb/kg)		Connector Type and Weight (lb/kg)			Pallet (lb/kg)	Total Weight (lb/kg)	
	3P	4P	3P	4P	Type	3P	4P		3P	4P
800	35/16	46/21	31/14	37/17	FCF	15/7	20/9	10/5	91/41	113/52
1000, 1250, 1600					RCTH or RCTV	6/3	8/4	10/5	82/38	101/47

1 Fixed circuit breaker weight = total weight – cradle weight.

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Section 2—Micrologic™ Electronic Trip Systems

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Overview of Micrologic Trip Systems

Model	LS0	LI	LSI	LSIG
	Long-Time + Short-Time + Zero Delay	Long-Time + Instantaneous Protection	Long-Time + Short-Time + Instantaneous Protection	Long-Time + Short-Time + Instantaneous Protection + Equipment Ground-Fault Protection
	(IEC Rated)	(UL Listed and ANSI Certified)	(UL LIsted, ANSI Certified, IEC Rated)	(UL LIsted, ANSI Certified, IEC Rated)
Basic Trip Unit	2.0	3.0	5.0	—
A Trip Unit	2.0A	3.0A	5.0A	6.0A
P Trip Unit	—	—	5.0P	6.0P
H Trip Unit	—	—	5.0H	6.0H

All Masterpact™ circuit breakers are equipped with the Micrologic trip system to protect power circuits and loads. Micrologic trip systems use a set of current transformers (called CTs or sensors) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker. Adjustable rotary switches on the trip unit allow the user to set the proper overcurrent or equipment ground-fault current protection required in the electrical system. If current exceeds a set value for longer than its set time delay, the trip system opens the circuit breaker. Alarms may be programmed for remote indications. Measurements of current, voltage, frequency, power, and power quality optimize continuity of service and energy management. Micrologic trip units can be changed on-site.

Integration of protection functions in the Application Specific Integrated Circuit (ASIC) electronic component used in all Micrologic trip units guarantees a high degree of reliability and immunity to conducted or radiated disturbances. On Micrologic P and H trip units, advanced functions are managed by an independent microprocessor.

Masterpact circuit breakers are shipped with the long-time pickup switch set at 1.0 and all other trip unit adjustments set at their lowest settings. Actual settings required for a specific application must be determined by a qualified consultant or plant engineer. A coordination study is recommended to provide coordination between all circuit breakers in the distribution system.

Figure 6: P Trip Unit with Power Metering

Thermal Imaging

The thermal imaging function protects the cables or bus bars from overheating in case of low amplitude repetitive faults. Such overheating can be due to repetitive motor starting, fluctuating load, intermittent ground faults, or subsequent closing after a fault.

Traditional electronic protection does not protect against repetitive faults because the duration of each overload above the pickup setting is too short to achieve effective tripping. Nevertheless, each overload involves a temperature rise in the installation, the cumulative effect of which could lead to overheating of the system.

The thermal imaging function remembers and integrates the thermal heating caused by each pickup setting overrun. Before tripping, the integrated heating value will reduce the associated time delay and, therefore, the reaction of the trip unit will be closer to the real heating of the power network system. After tripping, the function will also reduce the time delay when closing the circuit breaker on an overload.

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Power Supply Information

Ammeter (A) Trip Unit Without 24 Vdc Power Supply at F1 and F2

Sensor Plug Value (In)	Minimum Ground-Fault Pickup
100–250 A	30% of sensor rating
400–1200 A	20% of sensor rating
1600–6300 A	500 A

- Provides fault protection for LSIG functions
- Provides LED trip indication (powered by an onboard battery)
- All display functions and trip unit features power-up with current flow on one phase greater than or equal to the values in the table to the left
- Ground-fault push-to-trip button works for testing ground fault with current flow on one phase greater than or equal to the values shown in the following table

Ammeter (A) Trip Unit With 24 Vdc Power Supply at F1 and F2

The Ammeter (A) trip unit provides all of the above plus additional functionality when powered by external 24 Vdc power supply:

- Ammeter and bar graph displays are functional with or without current flowing through the circuit breaker
- Trip settings and (Max) current readings can be accessed on the display by pressing navigation button with or without current flowing through the circuit breaker
- Ground-fault push-to-trip button works for testing ground fault with or without current flowing through the circuit breaker
- Optional Modbus™ communications—Also requires a separate 24 Vdc power supply for the circuit breaker communications module

NOTE: Ground-fault push-to-trip button will also be functional if a hand-held test kit or full-function test kit is powering the trip unit.

Power (P) and Harmonic (H) Trip Unit Without 24 Vdc Power Supply at F1 and F2

The P and H trip units were designed to be used with the external 24 Vdc power supply. The large LCD display requires too much current to be powered by current flow through the circuit breaker. The P and H trip units do have a voltage power supply which will power the trip unit with 100 Vac or more between two phases or phase to neutral. The standard configuration for the voltage probes inside the circuit breaker is at the bottom connections. If the circuit breaker was open in a top fed application, there would be no voltage at the bottom of the circuit breaker and the trip unit would not be powered.

- Provides fault protection for LSIG functions
- Provides LED trip indication (powered by an onboard battery)

NOTE: Ground-fault push-to-trip button works for testing ground fault if the trip unit is powered by the voltage power supply. The ground-fault push-to-trip is also functional if a hand-held test kit or full-function test kit is powering the trip unit.

Power (P) and Harmonic (H) Trip Unit With 24 Vdc Power Supply at F1 and F2

- Provides all of the above
- LCD display and backlight are functional
- Ground-fault push-to-trip button works for testing ground fault
- All metering, monitoring, and history logs are functional
- Communications from trip unit to M2C and M6C programmable contact modules are powered by a 24 Vdc supply at F1 and F2. M6C also requires a 24 Vdc external power supply
- Modbus communications—Also requires a separate 24 Vdc power supply for the circuit breaker communications module.

NOTE: Ground-fault push-to-trip button will also be functional if hand-held test kit or full-function test kit is powering the trip unit.

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Micrologic Trip Units–Overview

True RMS Current Sensing

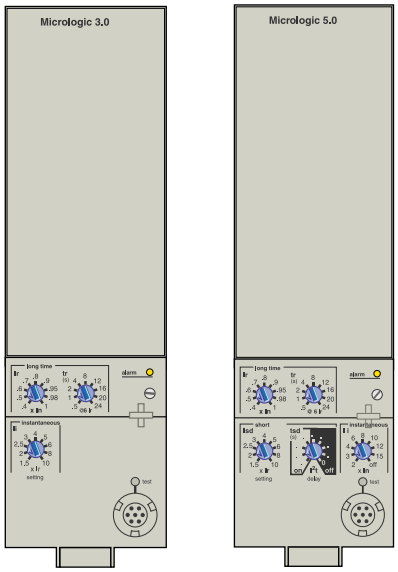
The sensing system responds to the flow of current through the circuit breaker. Electronic trip circuit breakers are limited to ac systems because the electronic trip system uses current transformers to sense the current.The Micrologic trip unit samples the current waveform to provide true RMS protection through the 15th harmonic.

This true RMS sensing gives accurate values for the magnitude of a non-sinusoidal waveform. Therefore, the heating effects of harmonically distorted waveforms are accurately evaluated.

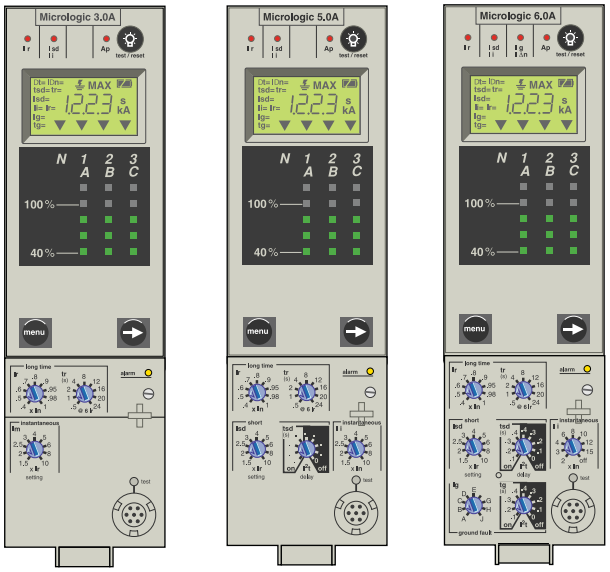
The Micrologic H trip unit provides additional sampling of the waveforms to measure and provide waveform capture of harmonic distortion to the 31st harmonic.

Masterpact universal power circuit breakers use Micrologic electronic trip systems to sense overcurrents and trip the circuit breaker. The Micrologic basic trip unit is standard and all Masterpact circuit breakers can be equipped with the optional Micrologic trip systems listed below:

- Micrologic Basic Trip Unit (standard).
  - — 2.0 basic protection (LS0, IEC)
  - — 3.0 basic protection (LI, UL®/ANSI)
  - — 5.0 selective protection (LSI)
- Micrologic A: Trip Unit with Ammeter.
  - — 2.0A basic protection (LS0, IEC)
  - — 3.0A basic protection (LI, UL/ANSI)
  - — 5.0A selective protection (LSI)
  - — 6.0A selective protection with ground-fault protection for equipment (LSIG)
- Micrologic P: Trip Unit with Power Metering.
  - — 5.0P selective protection (LSI)
  - — 6.0P selective protection with ground-fault protection for equipment (LSIG)
- Micrologic H: Trip Unit with Harmonic Metering.
  - — 5.0H selective protection (LSI)
  - — 6.0H selective protection with ground-fault protection for equipment (LSIG)



Micrologic 3.0 and 5.0 Basic Trip Units



Micrologic 3.0A, 5.0A and 6.0A Trip Units

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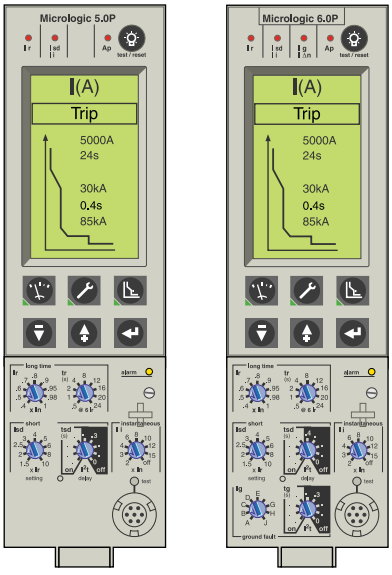
Table 20: Micrologic Trip Unit Features

	Micrologic Trip Unit (X = Standard Feature O = Available Option)										
	Standard			Ammeter				Power		Harmonics	
Feature	2.0	3.0	5.0	2.0A	3.0A	5.0A	6.0A	5.0P	6.0P	5.0H	6.0H
LI		X			X						
LS0	X			X							
LSI			X			X		X		X	
LSIG/Ground-Fault Trip[1]							X		X		X
Ground-Fault Alarm/No Trip[1,2]								X		X	
Ground-Fault Alarm and Trip[1,2]									X		X
Adjustable Rating Plugs	X	X	X	X	X	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X	X	X	X	X	X
UL Listed		X	X		X	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X	X	X	X	X	X
Phase-Loading Bar Graph				X	X	X	X	X	X	X	X
LED for Long-Time Pick-Up	X	X	X	X	X	X	X	X	X	X	X
LED for Trip Indication				X	X	X	X	X	X	X	X
Digital Ammeter				X	X	X	X	X	X	X	X
Zone-Selective Interlocking[3]				X		X	X	X	X	X	X
Communications				O	O	O	O	X	X	X	X
LCD Dot Matrix Display								X	X	X	X
Advanced User Interface								X	X	X	X
Protective Relay Functions								X	X	X	X
Neutral Protection[1]								X	X	X	X
Contact Wear Indication								X	X	X	X
Incremental Fine Tuning of Settings								X	X	X	X
Selectable Long-Time Delay Bands								X	X	X	X
Power Measurement								X	X	X	X
Power Quality Measurements										X	X
Waveform Capture										X	X

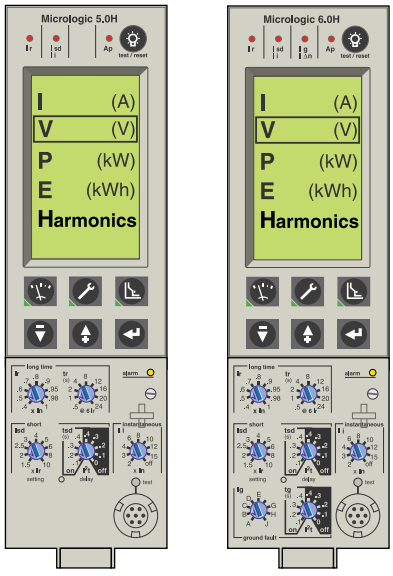
1 Requires neutral current transformer on three-phase four-wire loads.

2 Requires the M2C/M6C Programmable Contact Module.

3 Not available for 2.0A trip unit as upstream devices.



Micrologic 5.0P and 6.0P Trip Units



Micrologic 5.0H and 6.0H Trip Units

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Micrologic 2.0, 3.0, and 5.0 Basic Trip Units

The Micrologic 2.0, 3.0, and 5.0 trip units protect power circuits.

Protection Settings

1—Overload signal (LED)

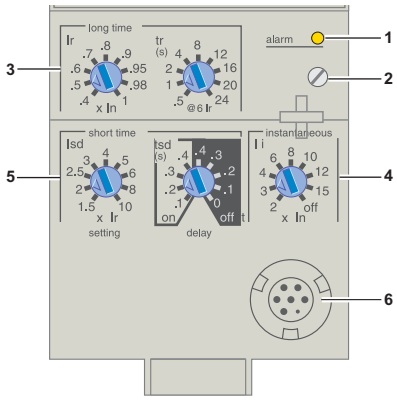
2—Long-time rating plug screw

3—Long-time current setting and tripping delay

4—Instantaneous pickup

5—Short-time pickup and tripping delay

6—Test connector



Micrologic 5.0 Basic Trip Unit

Protection thresholds and delays are set using the rotary switches. A full-range of long-time settings are available via field-installable adjustable rating plugs.

- Overload protection
  - — True RMS long-time protection
  - — Thermal imaging: Active thermal imaging before and after tripping
- Short-circuit protection.
  - — Short-time RMS
  - — Selection of I^2t type (ON or OFF) for short-time delay
- Instantaneous protection.
- Neutral protection on four-pole circuit breakers.

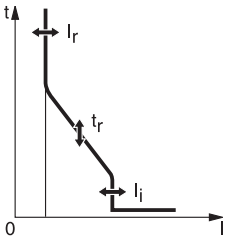


Table 21: Micrologic 2.0 and 3.0 Basic Trip Unit Settings

Long-Time Protection	Current Setting (A)		2.0:	0.40	0.50	0.60	0.70	0.80	0.90	0.95	0.98	1.00
	Tripping Between 1.05 and 1.20 x I_r	$I_r = I_n$ x...	3.0:	0.40	0.45	0.50	0.60	0.63	0.70	0.80	0.90	1.00
			Other ranges are available by changing rating plug									
	Time Delay (s)	t_r at 1.5 x I_r		12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to –20%	t_r at 6 x I_r		0.5	1	2	4	8	12	16	20	24
		t_r at 7.2 x I_r		0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
	Thermal Imaging		20 minutes before or after tripping									
Short-Time Protection	Current Setting (A)											
	Accuracy: ±10%	$I_{sd} = I_r$ x...	2.0:	1.5	2	2.5	3	4	5	6	8	10
	No Delay											
Instantaneous Protection	Current Setting (A)											
	Accuracy: ±10%	$I_i = I_n$ x...	3.0:	1.5	2	3	4	5	6	8	10	12

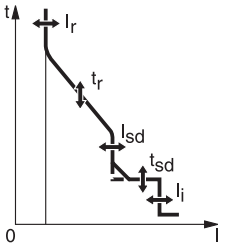


Table 22: Micrologic 5.0 Basic Trip Unit Settings

Long-Time Protection	Current Setting (A)		IEC:	0.40	0.50	0.60	0.70	0.80	0.90	0.95	0.98	1.00
	Tripping Between 1.05 and 1.20 x I_r	$I_r = I_n$ x...	UL/ANSI:	0.40	0.45	0.50	0.60	0.63	0.70	0.80	0.90	1.00
			Other ranges are available by changing rating plug									
	Time Delay (s)	t_r at 1.5 x I_r		12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to –20%	t_r at 6 x I_r		0.5	1	2	4	8	12	16	20	24
		t_r at 7.2 x I_r		0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
	Thermal Imaging		20 minutes before or after tripping									
Short-Time Protection	Current Setting (A)											
	Accuracy: ±10%	$I_{sd} = I_r$ x...		1.5	2	2.5	3	4	5	6	8	10
	Time Delay (s) at 10 x I_r	Settings	I^2t OFF	0	0.1	0.2	0.3	0.4				
			I^2t ON		0.1	0.2	0.3	0.4				
		t_{sd}	Min. trip time (ms)	20	80	140	230	350				
			Max. trip time (ms)	80	140	200	320	500				
Instantaneous Protection	Current Setting (A)											
	Accuracy: ±10%	$I_i = I_n$ x...		2	3	4	6	8	10	12	15	off

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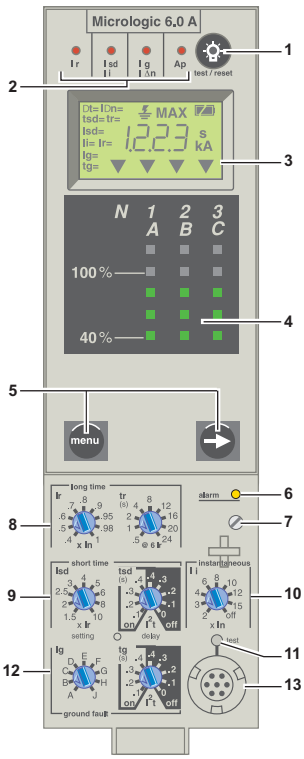
Micrologic 2.0A, 3.0A, 5.0A, & 6.0A Trip Units with Ammeter

Micrologic A trip units protect power circuits and provide current measurements, overload protection, and short-circuit protection. In addition, the 6.0A trip units also provide ground-fault protection for equipment.

Protection Settings



Micrologic 6.0A Trip Unit

1—Test lamp and reset

2—Indication of tripping cause

3—Digital display

4—Three-phase bar graph and ammeter

5—Navigation buttons

6—Overload signal (LED)

7—Long-time rating plug screw

8—Long-time current setting and tripping delay

9—Short-time pickup and tripping delay

10—Instantaneous pickup

11—Electronic push-to-trip

12—Ground-fault pickup and tripping delay

13—Test connector

Protection thresholds and delays are set using the rotary switches. The selected values are momentarily displayed in amperes and in seconds. A full-range of long-time settings are available via field-installable rating plug.

- Overload protection (true RMS long-time protection).
- Thermal imaging (active thermal imaging before and after tripping).
- Short-circuit protection.
  - — Short-time RMS
  - — I^2t ON or OFF for short-time delay
- Instantaneous protection.
- Ground-fault protection for equipment.
  - — Residual ground-fault protection for equipment
  - — Source ground-return ground-fault protection for equipment
  - — Modified differential ground-fault protection (MDGF) for equipment
- Neutral protection on four-pole circuit breakers.
- ZSI: Zone-selective interlocking (a ZSI terminal block may be used to interconnect a number of trip units to provide total discrimination for short-time and equipment ground-fault protection, without delay for tripping). Not available for 3.0 A trip unit. Not available for 2.0 A trip unit if installed as upstream device.

Ammeter Measurements

Micrologic A trip units measure the true RMS value of currents. They provide continuous current measurement from 0.2 to 20 x I_n with an accuracy of 1.5% (including sensors). No auxiliary source is needed where I > 0.2 x I_n. The optional external power supply (24 Vdc) makes it possible to display currents where I < 0.2 x I_n and to store values of the interrupted current. A digital LCD screen continuously displays the most heavily loaded phase (Imax) or displays the Ia, Ib, Ic, Ig, and (on 4P circuit breakers only) In stored current and setting values by successively pressing the navigation button.

Communication Network

Four wire Modbus, RTU, RS485

In conjunction with an optional communication network, the trip unit transmits the following parameters:

- Setting values.
- All ammeter measurements.
- Tripping causes.

NOTE: Current-based protection functions require no auxiliary power source. When an external power supply is added, the value of the interrupted current is stored by the trip unit. The reset button resets alarms, and stored interrupted current indications.

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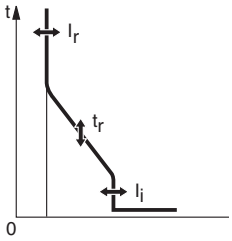

Table 23: Micrologic 2.0A and 3.0A Trip Unit Settings

Long-Time Protection	Current Setting (A) Tripping Between 1.05 and 1.20 x I_r	$I_r = I_n$ x...	2.0A:	0.40	0.50	0.60	0.70	0.80	0.90	0.95	0.98	1.00
			3.0A:	0.40	0.45	0.50	0.60	0.63	0.70	0.80	0.90	1.00
			Other ranges are available by changing rating plug									
	Time Delay (s) Accuracy: 0 to –20%	t_r at 1.5 x I_r		12.5	25	50	100	200	300	400	500	600
		t_r at 6 x I_r		0.5	1	2	4	8	12	16	20	24
		t_r at 7.2 x I_r		0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
	Thermal Imaging	20 minutes before or after tripping										
Short-Time Protection	Current Setting (A) Accuracy: ±10% No delay	$I_{sd} = I_r$ x...	2.0A:	1.5	2	2.5	3	4	5	6	8	10
Instantaneous Protection	Current Setting (A) Accuracy: ±10%	$I_i = I_n$ x...	3.0A:	1.5	2	3	4	5	6	8	10	12

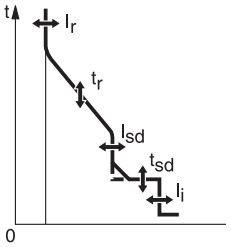

Table 24: Micrologic 5.0A and 6.0A Trip Unit Settings

Long-Time Protection	Current Setting (A) Tripping Between 1.05 and 1.20 x I_r	$I_r = I_n$ x...	IEC:	0.40	0.50	0.60	0.70	0.80	0.90	0.95	0.98	1.00
			UL/ANSI:	0.40	0.45	0.50	0.60	0.63	0.70	0.80	0.90	1.00
			Other ranges are available by changing rating plug									
	Time Delay (s) Accuracy: 0 to –20%	t_r at 1.5 x I_r		12.5	25	50	100	200	300	400	500	600
		t_r at 6 x I_r		0.5	1	2	4	8	12	16	20	24
		t_r at 7.2 x I_r		0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
	Thermal Imaging	20 minutes before or after tripping										
Short-Time Protection	Current Setting (A) Accuracy: ±10%	$I_{sd} = I_r$ x...		1.5	2	2.5	3	4	5	6	8	10
	Time Delay (s) at 10 x I_r	Settings	I^2t OFF	0	0.1	0.2	0.3	0.4				
			I^2t ON		0.1	0.2	0.3	0.4				
		t_{sd}	Min. trip time (ms)	20	80	140	230	350				
			Max. trip time (ms)	80	140	200	320	500				
Instantaneous Protection	Current setting (A) Accuracy: ±10%	$I_i = I_n$ x...		2	3	4	6	8	10	12	15	off

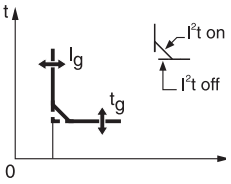

Table 25: Micrologic 6.0A Trip Unit Ground-Fault Settings

Ground-Fault Pickup (A) Accuracy: ±10%		$I_g = I_n$ x...	A	B	C	D	E	F	G	H	J
		$I_n \leq$ 400 A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
		400 A < $I_n \leq$ 1200 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
		I_n > 1200 A	500	640	720	800	880	960	1040	1120	1200
Time Delay (s) at 10 x I_r	Settings	I^2t OFF	0	0.1	0.2	0.3	0.4				
		I^2t ON		0.1	0.2	0.3	0.4				
	t_g	Minimum Trip Time (ms)	20	80	140	230	350				
		Maximum Trip Time (ms)	80	140	200	320	500				

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Micrologic 5.0P & 6.0P Trip Units with Power Metering

Protection Settings

1—Test lamp and indication reset

2—Indication of tripping cause

3—High resolution screen

4—Measurement display

5—Maintenance indicators

6—Protection settings

7—Navigation buttons

8—Overload signal (LED)

9—Long-time rating plug screw

10—Long-time current setting and tripping delay

11—Short-time pickup and tripping delay

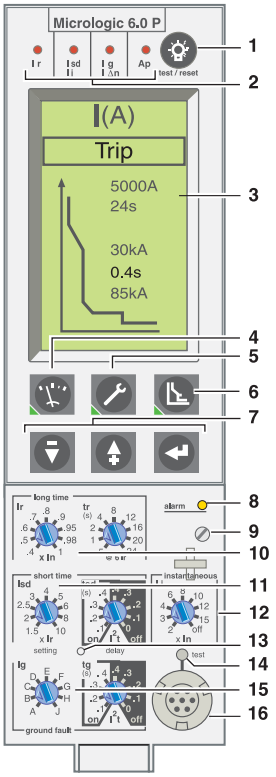
12—Instantaneous pickup

13—Hole for settings lockout pin

14—Electronic push-to-trip

15—Ground-fault pickup and tripping delay

16—Test connector



Micrologic 6.0P Trip Unit

The adjustable protection functions of the 5.0P and 6.0P trip units are identical to those of Micrologic A trip unit (overloads, short circuits, equipment ground-fault protection); see page 25.

These units also feature:

- **Fine adjustment**: Within the range below the rotary switch setting, fine adjustments of pickups/delays in steps of 1 A/s (except for short-time and ground-fault) are possible on the keypad or remotely by the communication network.
- **Inverse definite minimum time lag (IDMTL) setting**: Coordination with fuse-type or medium-voltage protection systems is optimized by adjusting the long-time delay curve around 6 x I_r axis. This setting ensures better coordination with certain loads.
- **Neutral protection**: On three-pole circuit breakers, neutral protection may be set using the keypad or remotely using the communication network to one of four positions:
  - — OFF
  - — 1/2N (1/2 x I_n)
  - — 1N (1 x I_n)
  - — 2N (2 x I_n)

NOTE: The neutral protection is disabled if the long-time curve is set to one of the IDMTL protection settings.

Configuring Alarms and Other Protection Functions

When the cover is closed, the keypad may no longer be used to change the protection settings, but it still provides access to the displays for measurements, histories, indicators, etc. Depending on the thresholds and time delays set, the Micrologic P trip unit monitors current, voltage, power, frequency, and phase sequence. Each threshold overrun may be signalled remotely via the communication network.

Each threshold overrun may be combined with tripping (protection) or an indication carried out by an optional M2C/M6C programmable contact (alarm), or both (protection and alarm).

Maintenance Record

The maintenance record can be consulted using the full-function test kit or remotely via the communication network. It can be used as an aid in troubleshooting and to assist scheduling for device maintenance operations.

Recorded indications include:

- Highest current measured
- Operation counter (both cumulative total and total since last reset)
- Number of test kit connections
- Number of trips in operating mode
- Contact wear (Masterpact NW only)

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Load Shedding and Reconnection Parameters

Load shedding and reconnection parameters can be set according to the power or the current flowing through the circuit breaker. Load shedding is carried out by a remote computer via the communication network or by an M2C or M6C programmable contact.

Indication Option via Programmable Contacts

The M2C (two contacts) and M6C (six contacts) programmable contacts may be used to signal threshold overruns or status changes. They can be programmed using the keypad on the Micrologic P and H trip units or remotely using the communication network. These contacts are required to obtain data from the protective relay functions on Type P and Type H trip units.

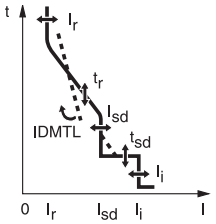

Table 26: Micrologic 5.0P and 6.0P Trip Unit Settings

Long-Time (RMS) Protection	Current Setting (A) Tripping Between 1.05 and 1.20 x I_r	$I_r = I_n$ x...	IEC:	0.40	0.50	0.60	0.70	0.80	0.90	0.95	0.98	1.00
		$I_r = I_n$ x...	UL/ANSI:	0.40	0.45	0.50	0.60	0.63	0.70	0.80	0.90	1.00
				Other ranges are available by changing rating plug								
	Time Delay (s) Accuracy: 0 to –20%	t_r at 1.5 x I_r		12.5	25	50	100	200	300	400	500	600
		t_r at 6 x I_r		0.5	1	2	4	8	12	16	20	24
		t_r at 7.2 x I_r		0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
	IDMTL Setting	Curve slope		SIT		VIT		EIT		HV Fuse		DT
	Thermal Imaging			20 minutes before or after tripping								
Short-Time (RMS) Protection	Current Setting (A) Accuracy: ±10%	$I_{sd} = I_r$ x...		1.5	2	2.5	3	4	5	6	8	10
	Time Delay (s) at 10 x I_r	Settings	I^2t OFF	0	0.1	0.2	0.3	0.4				
			I^2t ON		0.1	0.2	0.3	0.4				
		t_{sd}	Min. trip time (ms)	20	80	140	230	350				
			Max. trip time (ms)	80	140	200	320	500				
Instantaneous Protection	Current Setting (A) Accuracy: ±10%	$I_i = I_n$ x...		2	3	4	6	8	10	12	15	off

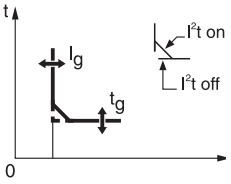

Table 27: Micrologic 6.0P Trip Unit Ground-Fault Setting

Ground-Fault Pickup (A) Accuracy: ±10%		$I_g = I_n$ x...	A	B	C	D	E	F	G	H	J
		$I_n \leq 400$ A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
		400 A < $I_n \leq$ 1200 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
		I_n > 1200 A	500	640	720	800	880	960	1040	1120	1200
Time Delay (s) at 10 x I_r	Settings	I^2t OFF	0	0.1	0.2	0.3	0.4				
		I^2t ON		0.1	0.2	0.3	0.4				
	t_g	Minimum trip time (ms)	20	80	140	230	350				
		Maximum trip time (ms)	80	140	200	320	500				

Table 28: Settings for Alarms for Other Protection Functions for Micrologic 5.0P and 6.0P Trip Units

			Threshold	Time Delay
Current	Current Imbalance		0.05 to 0.6 x I_{max}	1 to 40 s
	Maximum Current	I_{max}: I_a, I_b, I_c, I_n, I_g	0.2 to 1.0 x I_n	15 to 1500 s
Voltage	Voltage Imbalance		0.02 to 0.3 x V_n	1 to 40 s
	Minimum Voltage	V_{min}	100 to 725 V (phase total)	0.25 to 0.5 s
	Maximum Voltage	V_{max}	100 to 1200 V (between phases)	0.20 to 5.0 s
Power	Maximum Power	P_{max}	5 to 500 kW	0.2 to 20 s
	Reverse Power	P_r	0.02 to 0.2 x P_n	0.5 to 20 s
Frequency	Minimum Frequency	F_{min}	45 to 65 Hz	0.2 to 5 s
	Maximum Frequency	F_{max}	45 to 540 Hz	0.2 to 5 s
Phase	Sequence	ΔØ	ØA-ØB-ØC or ØA-ØC-ØB	Instantaneous

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Table 29: Load-Shedding Settings for Current and Power Metering for Micrologic 5.0P and 6.0P Trip Units

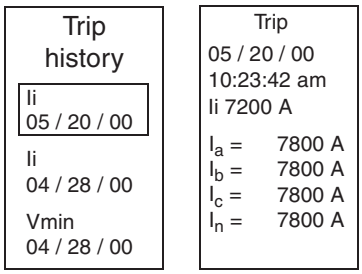
		Pick-Up		Drop-Out	
		Threshold	**Time Delay**	**Threshold**	**Time Delay**
Current	I	0.5 to 1.0 x I_r per phase	20% to 80% x t_r	0.3 to 1.0 x I_r per phase	10 to 600 s
Power	P	200 kW to 10 MW	10 to 3600 s	100 kW to 10 MW	10 to 3600 s

Trip and Alarm Histories

The last ten trips and ten alarms are recorded in two separate history files that can be displayed on the screen (sample displays are shown to the right). The following information is contained in these files:

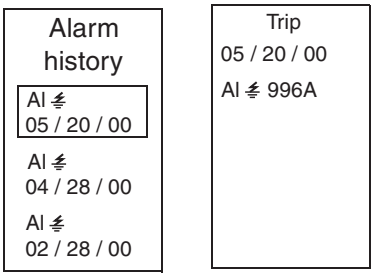
Trip History

- Type of fault
- Date and time of fault
- Interrupted current
- Contact wear



Alarm History

- Type of alarm
- Date and time of the alarm
- Values measured at the time of the alarm



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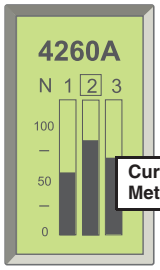

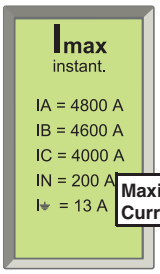

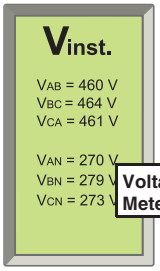

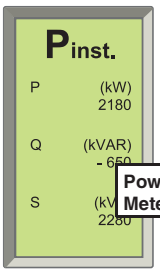

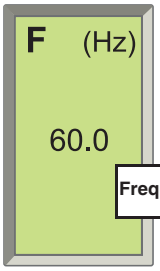

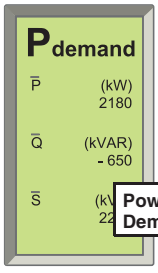

Metering

The Micrologic P trip unit calculates in real time all electrical values V, A, W, VAR, VA, Wh, VARh, VAh, Hz, power factor, and crest factor. The Micrologic P trip unit also calculates demand current and demand power over an adjustable time period.

Real-Time Metering: The value displayed on the screen is refreshed every second. Minimum and maximum measurement values are stored in memory.

Type of Measurement		Unit of Measurement	Measurement Source
Current	I_{RMS}	A	ØA, ØB, ØC or N
	$I_{AVERAGE}$	A	(ØA + ØB + ØC)/3
	$I_{PEAK/\sqrt{2}}$	A	ØA, ØB, ØC or N
Voltage	V_{RMS}	V	(ØA–ØB), (ØB–ØC) and (ØC–ØA)
	V_{RMS}	V	(ØA–N), (ØB–N) and (ØC–N)
	$V_{IMBALANCE}$	%	V_{RMS}
Power	P, Q and S	W, VAR, VA	Total
	EP, EQ and ES	Wh, VARh, VAh	Total
	Power factor		Total
Frequency	F	Hz	50/60

Demand Metering: The demand is calculated over a fixed or sliding time window that can be programmed from five to 60 minutes. Depending on the contract signed with the power supplier, specific programming makes it possible to avoid or minimize the cost of overrunning the subscribed power. Maximum demand values are systematically stored and time stamped.

Type of Measurement		Unit of Measurement	Measurement Source
Current	I_{DEMAND}	A	ØA, ØB, ØC or N
Power	P, Q and S_{DEMAND}	W, VAR, VA	Total

Communication Network

Four wire Modbus, RTU, RS485—The communication network may be used to:

- Remotely read parameters for the protection functions
- Transmit all the measurements and calculated values
- Signal the causes of tripping and alarms
- Consult the history files and the maintenance indicator record

In addition, an event log of the last 100 events and a maintenance record, which is stored in the trip unit memory but not available locally, may be accessed via the communication network.

The Modbus communication system is compatible with Powerlogic™ System Manager™ (SMS) software.

Event Log

The event log may be accessed by a remote computer via the communication network. All events are time stamped and include:

- Trips
- Beginning and end of alarms
- Modifications to settings and parameters
- Loss of time
- Overrun of wear indicators
- Test kit connections
- Counter resets
- System faults (thermal self-protection, major fault and minor fault alarms)

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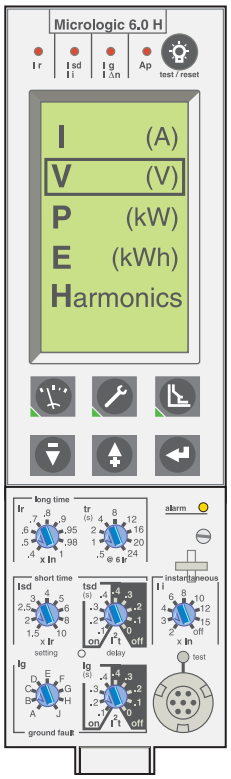
Micrologic 5.0H & 6.0H Trip Units with Harmonic Metering



Micrologic 6.0H Trip Unit

In addition to the P functions, the Micrologic H trip units offer:

- In-depth analysis of power quality including calculation of harmonics and the fundamentals.
- Diagnostics aid and event analysis through waveform capture.
- Customized alarm programming to analyze and track down a disturbance on the ac power system.
- Systematic time stamping of all events and creation of logs.

Metering

The Micrologic H trip unit offers all the measurements carried out by the Micrologic P trip unit, with the addition of phase-by-phase measurements of power and energy as well as calculation of:

- Current and voltage total harmonic distortion (THD, thd).
- Current, voltage and power fundamentals (50/60 Hz).
- Harmonic components (amplitude and phase) up to the 31st current and voltage harmonic.

Real-Time Metering: The value displayed on the screen is refreshed every second. The table below shows what is measured in real-time metering.

Type of Measurement		Unit of Measurement	Measurement Source
Current	I_{RMS}	A	ØA, ØB, ØC or N
	$I_{AVERAGE}$	A	(ØA + ØB + ØC) / 3
	$I_{PEAK/÷2}$	A	ØA, ØB, ØC or N
	$I_{IMBALANCE}$	%	ØA, ØB, ØC or N
Voltage	V_{RMS}	V	(ØA–ØB), (ØB–ØC) and (ØC–ØA)
	V_{RMS}	V	(ØA–N), (ØB–N) and (ØC–N)
	$V_{IMBALANCE}$	%	V_{RMS}
Power	P, Q and S	W, VAR, VA	Total
	EP, EQ and ES	Wh, VARh, VAh	Total
	Power factor		Total
Frequency	F	Hz	ØA, ØB, or ØC
Power Quality Indicators	Fundamentals	50/60 Hz component	V, I, P, Q, and S
	THD	%	V/I
	V and I harmonics	Amplitude to phase	1, 2, 3, 4...50

Demand Metering: Similar to the Micrologic P trip unit, demand values are calculated over a fixed or sliding time window that can be set from five to 60 minutes.

Type of Measurement		Unit of Measurement	Measurement Source
Current	I_{DEMAND}	A	ØA, ØB, ØC or N
Power	P, Q and S_{DEMAND}	W, VAR, VA	Total

Waveform Capture

Micrologic H trip units can capture and store current and voltage waveforms using digital sampling techniques similar to those used in oscilloscopes. Using the information available in the captured waveform, it is possible to determine the level of harmonics as well as the direction and amplitude of the flow of harmonic power.

Users of Micrologic H trip units can record manually via the keypad the following waveforms:

- The four currents: I_a, I_b, I_c, and I_N
- The three phase-to-phase voltages: V_{ab}, V_{bc}, and V_{ca}

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Waveforms may be displayed on the graphic screen of Micrologic H trip units or communicated over a networked system. The recording takes place over one cycle with a measurement range of 0 to 1.5 I_N for current and 0 to 690 volts for voltage. The resolution is 64 points per cycle.

Customized Alarm Programming

The instantaneous value of each measurement can be compared to user-set high and low thresholds. Overrun of a threshold generates an alarm. Programmable action can be linked to each alarm, including circuit breaker opening, activation of an M2C or M6C contact, recording of measurements in a log, etc.

Event Logs

Each event is recorded with:

- The date, time, and name of the event.
- The event characteristics.

Additional Technical Characteristics for Type P and Type H Trip Units

- Setting the display language: System messages can be displayed in six different languages:
  - English - US
  - English - UK
  - French
  - German
  - Spanish
  - Italian

The desired language is selected via the keypad.

- Protection functions: All current-based protection functions require no auxiliary source. Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker on the bottom side. (Optional external voltage measurement is available.)
- Accuracy of measurements (including sensors):
  - Voltage (V) 1%
  - Current (A) 1.5% (higher accuracy [1%] may be achieved with special calibration on the current transformer [CT characterization option])
  - Frequency (Hz) 0.1 Hz
  - Power (W) and energy (Wh) 2.5%
  - The Micrologic H trip unit uses a dedicated metering data chain separate from the protection data chain so that a greater number of data samples can be used for metering. This increases the number of samples taken per time period, which in turn gives the H trip unit a higher degree of metering accuracy.
- Stored information: The fine setting adjustments, the last 100 events and the maintenance record remain in the trip unit memory even when power is lost.
- Reset: An individual reset, via the keypad or remotely, will reset alarms, minimum and maximum data, peak values, counters and the indicators.

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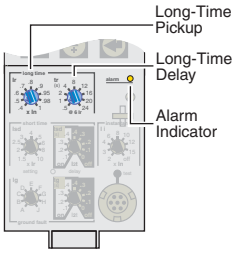
Micrologic Trip Unit Functions

Long-Time Trip Functions

The *long-time pickup* switch sets the maximum current level the circuit breaker will carry continuously. The maximum current level (I_r) is the long-time pickup setting multiplied by the sensor plug amperage (I_n). If the current exceeds this value for longer than the long-time delay time, the circuit breaker will trip.

The *long-time delay* switch sets the length of time that the circuit breaker will carry a sustained overload before tripping. Delay bands are labeled in seconds of overcurrent at six times the ampere rating. For maximum coordination, there are eight delay bands. Long-time delay is an “inverse time” characteristic in that the delay time decreases as the current increases.

The trip unit includes an *alarm indicator* that will be lit continuously when the current is above 100% of the pickup setting.

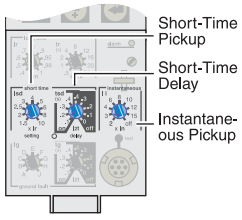


Long-Time Trip Functions

Short-Time Trip Functions

The *short-time pickup* switch sets the short-circuit current level at which the circuit breaker will trip after the set short-time delay. The short-time current (I_{sd}) equals the short-time pickup setting multiplied by the long-time pickup (I_r).

The *short-time delay* switch sets the length of time the circuit breaker will carry a short circuit within the short-time pickup range. The delay (based on 10 times the ampere rating I_r) can be adjusted to four positions of I^2t ramp operation (I^2t ON) or five positions of fixed time delays (I^2t OFF). I^2t ON delay is an “inverse time” characteristic in that the delay time decreases as the current increases. Short-time delay for the 2.0 trip unit is fixed at a delay band of 20 to 80 ms.



Short-Time and Instantaneous Trip Functions

Instantaneous Trip Function

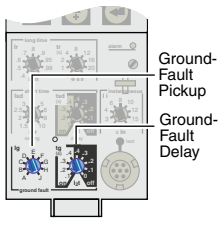
The *instantaneous pickup* switch sets the short-circuit current level at which the circuit breaker will trip with no intentional time delay. The instantaneous current (I_i) is equal to the instantaneous pickup setting multiplied by the sensor plug amperage (I_n).

The instantaneous function will override the short-time function if the instantaneous pickup is adjusted at the same or lower setting than the short-time pickup. In trip units with both adjustable short-time and instantaneous trip functions, the adjustable instantaneous trip can be disabled by setting Instantaneous pickup to OFF.

Ground-Fault Trip Functions

The *ground-fault pickup* switch sets the current level at which the circuit breaker will trip after the set ground-fault delay. Ground-fault pickup values (I_g) are based on circuit breaker sensor plug (I_n) only, not on the rating plug multiplier (I_r). Changing the rating plug multiplier has no effect on ground-fault pickup values.

The *ground-fault delay* switch sets the length of time the circuit breaker will carry ground-fault current which exceeds the ground-fault pickup level before tripping. The delay (based on the sensor plug amperage (I_n) can be adjusted to four positions of I^2t ramp operation (I^2t ON) or five positions of fixed time delays (I^2t OFF). I^2t ON delay is an “inverse time” characteristic in that the delay time decreases as the current increases.



Ground-Fault Trip Functions

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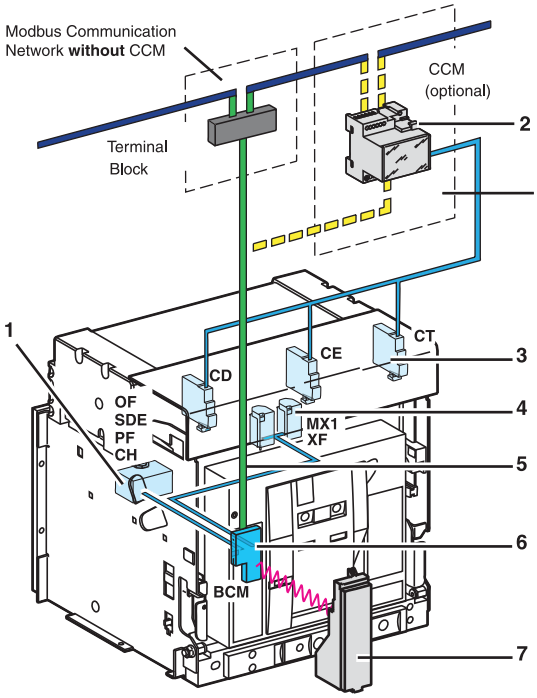
Communication Network

Masterpact NW/NT circuit breaker, and Micrologic trip unit information is available via a Modbus network to Powerlogic™ System Manager™ software (SMS) or other applications for reporting and recording. Information available includes:

- Circuit breaker identification and status.
- Remote control of circuit breaker operation.
- View and set protection function parameters.
- Real-time readings.
- Trip indication.
- Alarm reporting.
- Historical files and maintenance records.

Figure 7: Communication Network



1—Circuit breaker switches (OF, SDE, PF, and CH)
2—Cradle communication module (CCM)
3—Cradle switches (CD, CE and CT)
4—Shunt trip (MX1) and shunt close (XF)
5—Communication bus
6—Circuit breaker communication module (BCM)
7—Trip unit

The Modbus circuit breaker communication feature is standard on the Micrologic P and H trip units and available for the Micrologic A trip unit.

Modbus Circuit Breaker Communication Module (BCM)

Circuit Breaker Communication Module (BCM)

The Modbus circuit breaker communication module (BCM) is installed in the circuit breaker and requires a separate, isolated 24 Vdc power source. The BCM is optically coupled to the Micrologic trip unit to ensure a high level of isolation between the trip unit and the communication network. The Modbus BCM provides circuit breaker status via dedicated O/F (open or closed), SDE (fault tripped), CH (spring charged), and PF (ready-to-close) switches and provides the capability of remotely controlling the circuit breaker. It also maintains an event log of circuit breaker status containing the number of times the circuit breaker has experienced each status position with the date and time of the last transition. This information and the remote control capability are available to a Modbus supervisor system via a Modbus communication network.

The following may be connected to this module:

- A set of dedicated switches which read the status of the circuit breaker.
- A set of “actuators” (MX/XF) to control the circuit breaker.

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Cradle Communication Module (CCM)

Modbus Cradle Communication Module (CCM)

The optional Modbus cradle communication module (CCM) is installed adjacent to the circuit breaker cradle and is the gateway between the Modbus network and the Modbus BCM. The Modbus CCM provides circuit breaker cradle status including connected position (CE), disconnected position (CD) and test position (CT). The CCM monitors the communication parameters of the Modbus BCM and trip unit when it detects a circuit breaker being racked from the cradle. When the circuit breaker is reinstalled or a spare circuit breaker is installed and racked into the cradle, the CCM automatically downloads the address, baud rate, and parity into the BCM. This capability allows a circuit breaker to be replaced without the need to manually configure the communication parameters in the Modbus BCM.

The CCM maintains an event log of the date and time of the last circuit breaker transition. In order to aid system communication troubleshooting, the CCM has visual indication of the module's operating status by means of two LEDs.

Table 30: Characteristics

Circuit Breaker Identification				
● ID Code, Address				
● Size, Rating, Performance				
● Type of Trip Unit				
● Type of Long-Time Rating Plug				
Status Indication				
● ON/OFF Indication				
● Connected/Disconnected/Test Pos.				
● Ready-to-Close				
● Fault Trip				
Controls				
● Opening/Closing				
Settings		Circuit Breaker and Trip Unit		
		A	P	H
● Reading of Settings on Rotary Switches		X	X	X
● Fine Settings in the Range Imposed by the Rotary Switches			X	X
● Setting of Protection and Alarms			X	X
● Customized Alarm Programming				X
Operating and Maintenance Aids				
Reading of Protection and Alarms	Standard		X	X
	Set		X	X
	Customized			X
Reading of Measurements	Current	X	X	X
	Voltages, frequency, power, etc.		X	X
	Power quality: Fundamentals and harmonics			X
Waveform Capture				X
Histories	History of trips and alarms[1]		X	X
	Log of trips and alarms			X
Indicators	Contact wear, counters, etc.		X	X
	Maintenance record			X

[1] Up to 10 trips and 10 alarms.

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Powerlogic System

System Manager, used for power systems and energy management, provides the human-machine interface (HMI) for electrical system information on a PC:

- Screens including real-time readings, breaker status and remote control operation.
- Tables displaying real-time readings, maintenance information and date and time of last operation.
- Waveform captures including harmonic content.
- Tabular displays of event logs and data logs.
- Alarm annunciation and recording.

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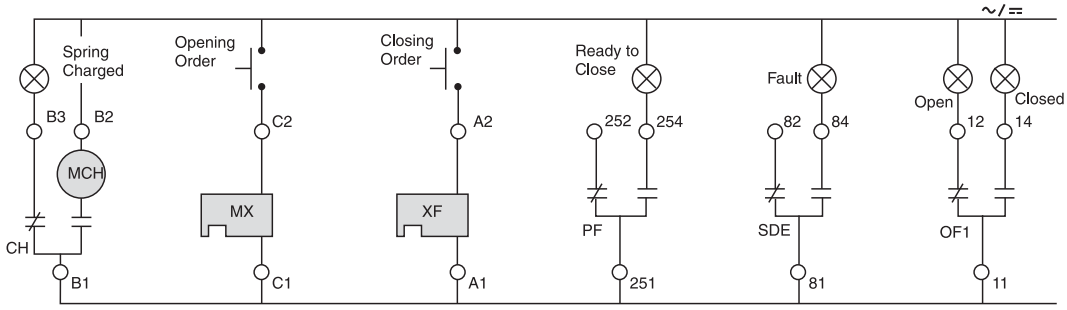
Options for Remote Operation

Two options are available for remote operation of Masterpact™ circuit breakers: direct connection or a communication network.

NOTE: When remote operation features are used, a minimum of four seconds is required for the spring charging motor (MCH) to completely charge the circuit breaker closing springs prior to actuating the shunt close (XF) device.

The wiring diagrams for these two options are shown below.

Figure 8: Wiring Diagram for Remote ON/OFF Function by Direct Connection



Remote Operation Accessories

The remote ON/OFF function is used to remotely open and close the circuit breaker. It is made up of the following components:

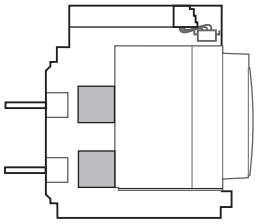
- A spring-charging motor (MCH) equipped with a spring-charged limit switch; see page 39 for more information.
- A shunt close (XF); see page 40 for more information.
- A shunt trip (MX1); see page 40 for more information.

Optionally, the function may be completed with:

- A ready-to-close contact (PF).
- An electrical closing push button (BPFE).
- A remote reset following a fault (RES).

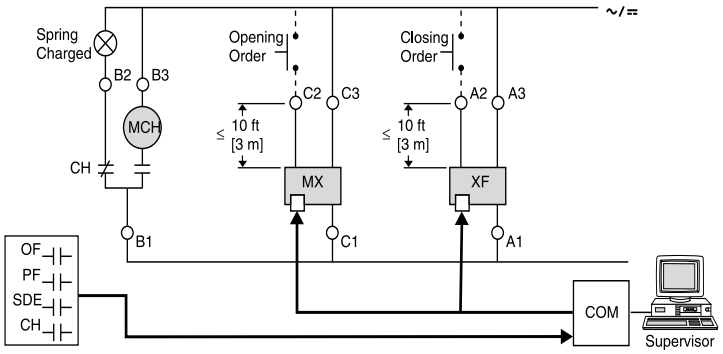
The remote operation function may be completed with:

- Auxiliary contacts (OF).
- Overcurrent trip switch (SDE).



Masterpact Circuit Breaker Equipped for Remote ON/OFF Function Cluster shield is not shown

Figure 9: Wiring Diagram for Remote ON/OFF Function by Communication Network



NOTE: Induced voltages in the circuit at terminal C2 and/or A2 can cause the shunt close to not work properly. The best way to prevent induced voltages is keep the circuit to terminal C2 and A2 as short as possible. If it is impossible to keep the circuit less than 10 feet (3 m), use an interposing relay near terminal C2 or A2.

NOTE: When communicating MX1 or XF coils are used, terminal (C3 or A3) must be connected to line even if the communication module is not installed. The bypass circuit through terminal C2/A2 is only momentary duty for 0.5 sec. For continuous duty, use the communications command.

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Terminals

Table 31: Terminal Characteristics

Standards		UL 486E
Termination Capacity		22–14 AWG solid or stranded wire with max. O.D. of insulation 3.5 mm
Current	Nominal	10 A
	Minimum	100mA at 24 V
Pull-Out Forces		22 AWG = 4.5 lbs (20 N) 20 AWG = 6.75 lbs (30 N) 18 AWG = 6.75 lbs (30 N) 16 AWG = 9 lbs (40 N) 14 AWG = 11.5 lbs (50 N)

Terminal

Spring-Charging Motor (MCH)

The spring-charging motor automatically charges the spring mechanism for closing the circuit breaker and also recharges the spring mechanism when the circuit breaker is in the ON position. Instantaneous reclosing of the circuit breaker is thus possible following circuit breaker opening. The spring-mechanism charging handle is used only as a backup if auxiliary power is absent.

The spring-charging motor is equipped as standard with a limit switch contact (CH) that signals the charged position of the mechanism (springs charged).

Spring-Charging Motor (NW)

Spring-Charging Motor (NT)

Table 32: Spring-Charging Motor Characteristics

Characteristics		**MCH**
Voltage Ratings (V_n)	Vac 50/60 Hz	48/60, 100/130, 200/250, 240/277, 380/415, 400/440, 480
	Vdc	24/30, 48/60, 100/125, 200/250
Operating Threshold		0.85 to 1.1 V_n
Power Consumption		180 VA
Motor Overcurrent		2–3 x I_n for 0.1 s
Charging Time		4 s maximum on NW, 3 s maximum on NT
Duty Cycle		3 cycles per minute maximum
Endurance		10,000 cycles for NW < 4000 A 5000 cycles for NW ≥ 4000 A
CH Contact		10 A at 240 V

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Shunt Trip (MX1) and Shunt Close (XF)

Maximum Wire Length—The inrush currents for these devices are approximately 200 VA. When low supply voltages (12, 24 or 48 V) are used, the maximum allowable wire length is dependent on the voltage and the wire size.

Table 33: Maximum Wire Length[1]

Device	Percent of Source Voltage	Source Voltage					
		12 Vdc		24 Vdc		48 Vdc	
Wire Size		14 AWG (2.08 mm²)	16 AWG (1.31 mm²)	14 AWG (2.08 mm²)	16 AWG (1.31 mm²)	14 AWG (2.08 mm²)	16 AWG (1.31 mm²)
UVR (MN)	100%	—	—	159 ft (48.5 m)	100 ft (30.5 m)	765 ft (233.2 m)	472 ft (143.9 m)
	85%	—	—	44 ft (13.4 m)	29 ft (8.8 m)	205 ft (62.5 m)	129 ft (39.3 m)
Shunt Trip (MX) and Shunt Close (XF)	100%	57 ft (17.4 m)	34 ft (10.4 m)	314 ft (95.7 m)	200 ft (61.0 m)	1503 ft (457.8 m)	944 ft (287.7 m)
	85%	27 ft (8.2 m)	17 ft (5.2 m)	205 ft (62.5 m)	126 ft (38.4 m)	957 ft (291.7 m)	601 ft (183.2 m)

[1] The length shown in the table is for each of the two supply wires.

Shunt Trip (MX1): When energized, the shunt trip instantaneously opens the circuit breaker. The shunt trip may be energized continuously or intermittently.

Shunt Close (XF): Remotely closes the circuit breaker if the spring mechanism is charged.

NOTE: Do not use a standing close order on the shunt close coil (XF). Any opening order will open the breaker so a standing close order is not necessary. See Anti-Pump Feature on page 5.

Shunt Trip (MX1) and Shunt Close (XF)

Communication versions of the MX1 and XF are available for direct connection via the circuit breaker communication module (BCM).

Table 34: Shunt Trip and Shunt Close Characteristics

Characteristics		MX1 and MX2	XF	Min	Max
Voltage Ratings (V_n)	Vac 50/60 Hz	24 Vac		17 Vac	26 Vac
		48 Vac		34 Vac	52 Vac
		120 Vac		60 Vac	132 Vac
		240 Vac		168 Vac	264 Vac
		277 Vac		194 Vac	304 Vac
		380 Vac		266 Vac	418 Vac
		480 Vac		336 Vac	528 Vac
	Vdc	12 Vdc		8 Vdc	13 Vdc
		24 Vdc		17 Vdc	26 Vdc
		48 Vdc		34 Vdc	52 Vdc
		125 Vdc		88 Vdc	137 Vdc
		250 Vdc		175 Vdc	275 Vdc
Operating Threshold		0.7 to 1.1 V_n	0.85 to 1.1 V_n		
Power Consumption (VA or W)	Steady-State/Inrush	4.5/200			
Circuit Breaker Response Time at V_n[1]		50 ms ±10 (NW and NT)	70 ms ±10 (NW ≤ 4000 A) 80 ms ±10 (NW > 4000 A) 55 ms (NT)		

[1] Shunt trip (MX1) and shunt close (XF) circuits must be energized for minimum of 200 ms.

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Additional Shunt Trip (MX2) or Undervoltage Trip (MN)

This function opens the circuit breaker via an electrical order.

Second Shunt Trip (MX2)

It is made up of:

- Shunt trip (MX2, second MX) or,
- Undervoltage trip (MN)
  - — Instantaneous trip
  - — Fixed undervoltage trip (time delayed) or,
  - — Adjustable undervoltage trip (time delayed)

As shown in the wiring diagram for the remote tripping function below, the delay unit (installed outside the circuit breaker) may be disabled by an emergency off button to obtain non-delayed opening of the circuit breaker.

When energized, the shunt trip (MX1 or MX2) instantaneously opens the circuit breaker.

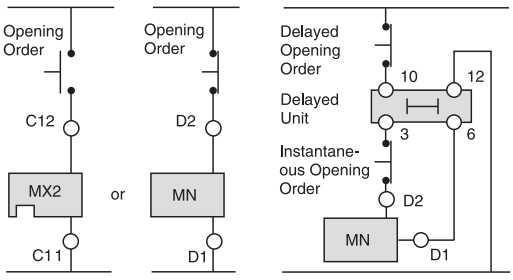
The undervoltage trip (MN) instantaneously opens the circuit breaker when its supply voltage drops to a value between 35% and 70% of its rated voltage.

If the undervoltage trip is not energized, it is impossible to close the circuit breaker, either manually or electrically. An attempt to close the circuit breaker produces no movement of the main contacts. Closing is allowed when the supply voltage of the undervoltage trip reaches 85% of rated voltage.

Table 35: Undervoltage Trip Characteristics

Characteristics		MN
Voltage Ratings (V_n)	Vac 50/60 Hz	24 Vac
		48 Vac
		120 Vac
		240 Vac
		277 Vac
		380 Vac
		480 Vac
	Vdc	12 Vdc
		24 Vdc
		48 Vdc
		125 Vdc
		250 Vdc
Power Consumption (VA or W)	Constant/Inrush	4.5/200
Operating Threshold	Opening	0.35 to 0.70 Vn
	Closing	0.85 Vn
Circuit Breaker Response Time at V_n	NW	90 ms ±10
	NT	40 ms ±10

Figure 10: Wire Diagram for the Remote Tripping Function



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Time-Delay Module for Undervoltage Trip

To eliminate circuit breaker nuisance tripping during temporary voltage dips (micro-breaks), operation of the undervoltage trip (MN) can be delayed. This function is achieved by adding an external delay unit (either adjustable or non-adjustable) to the undervoltage trip (MN) circuit.

Time-Delay Module for Undervoltage Trip (MN)

Table 36: Time-Delay Module Characteristics

Voltage Ratings of Undervoltage Trip		Vac 50/60 Hz	24/30, 48/60, 100/130, 200/250, 380/480
		Vdc	24/30, 48/60, 100/130, 200/250
Voltage Ratings of Time-Delay Module	Adjustable	Vac 50/60 Hz	48/60, 100/130, 200/250, 380/480
		Vdc	48/60, 100/130, 200/250, 380/480
	Non-Adjustable	Vac 50/60 Hz	100/130, 200/250
		Vdc	100/130, 200/250
Operating Threshold		Opening	0.35 to 0.7 V_n
		Closing	0.85 V_n
Power Consumption			4.5 VA/W (Holding), 200 VA/W (Inrush)
Time-Delay Settings	Adjustable		0.5, 0.9, 1.5, and 3.0 s
	Non-Adjustable		0.25 s

Ready-to-Close Switch (PF)

The ready-to-close position switch indicates that the following conditions are met and the circuit breaker can be closed:

- The circuit breaker is open.
- The closing springs are charged.
- There is no standing closing or opening order.

Ready-to-Close Switch (PF)

Table 37: Ready-to-Close Switch Characteristics

Type of Contact	1a/1b Form C			
Maximum Number of Contacts	1			
Breaking Capacity at a Power Factor (p.f.) of 0.3	Standard: 100 mA/24V minimum load		Low-Level: 2 mA/15 V minimum load	
	240/380 Vac	5 A	24/48 Vac	3 A
	480 Vac	5 A	240 Vac	3 A
	600/690 Vac	3 A	380 Vac	3 A
	24/48 Vdc	3 A	24/48 Vdc	3 A
	240 Vdc	0.3 A	125 Vdc	0.3 A
	380 Vdc	0.15 A	250 Vdc	0.15 A

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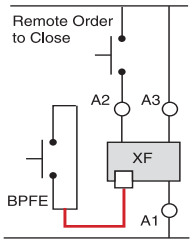
Electrical Closing Push Button (BPFE)

Located on the front panel of the circuit breaker, this push button carries out electrical closing of the circuit breaker, taking into account all of the safety functions that are part of the control/monitoring system of the installation. The push button is installed on the control circuit of the shunt close, and connects to the communicating shunt close module (XF-COM). Terminal A2 of XF-COM is used to remotely close the circuit breaker.

Electrical Closing Push Button (BPFE)



Remote Reset (RES) and Automatic Reset After Fault Trip

- Following tripping, the remote reset (RES) resets the overcurrent trip switch (SDE) and the mechanical indicator. (Voltage rating: 110/130 Vac and 200/240 Vac.) RES is not compatible with an additional overcurrent trip switch (SDE2).
- Automatic reset after fault-trip: following tripping, a reset of the mechanical indicator (reset button) is no longer required to enable circuit breaker closing (factory adjustable only).

Switches and Switch Accessories

Auxiliary Switch (OF)

The rotary-type auxiliary switches are directly driven by the trip mechanism when the minimum isolation distance between the main circuit breaker contact is reached.

Auxiliary Switch (OF) with Four Contacts for Masterpact NW Circuit Breaker

Masterpact NT Aux Switch (OF) with One Contact

Table 38: Auxiliary Switch Characteristics

Circuit Breaker Type			NT	NW
Supplied as Standard (Form C)			4	4
Maximum Number of Contacts			4	12
Breaking Capacity at a Power Factor (p.f.) of 0.3	Standard (100 mA/24 V minimum load)			
	Vac	240/380	6 A	10 A
		480	6 A	10 A
		600/690	6 A	6 A
	Vdc	24/48	2.5 A	10 A
		240	0.5 A	10 A
		380	0.3 A	3 A
	Low-Level (1 mA/4 V minimum load with a maximum current and voltage of 100 mA/10 V. Note: If the maximum voltage and current is exceeded, the low-level function of the switch will be lost but the switch will continue to function as a standard switch with the following specifications.			
	Vac	24/48 Vac	5 A	6 A
		240 Vac	5 A	6 A
		380 Vac	5 A	3 A
	Vdc	24/48 Vdc	5/2.5 A	6 A
		125 Vdc	0.5 A	6 A
		250 Vdc	0.3 A	3 A

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Overcurrent Trip Switch (SDE)

Circuit breaker tripping due to a fault is signalled by a red mechanical fault indicator (reset) and one overcurrent trip switch (SDE).

Following tripping, the mechanical indicator must be reset before the circuit breaker may be closed. An additional overcurrent trip switch (SDE2) is supplied as an option and is not compatible with the remote reset (RES).

Overcurrent Trip Switch (SDE)

Table 39: Overcurrent Trip Switch Characteristics

Supplied as Standard	1a/1b Form C			
Maximum Number of Contacts	2			
	Standard: 100 mA/24 V Minimum Load		Low-Level: 2 mA/15 V Minimum Load	
Breaking Capacity at a Power Factor (p.f.) of 0.3	240/380 Vac	5 A	24/48 Vac	3 A
	480 Vac	5 A	240 Vac	3 A
	600/690 Vac	3 A	380 Vac	3 A
	24/48 Vdc	3 A	24/48 Vdc	3 A
	240 Vdc	0.3 A	125 Vdc	0.3 A
	380 Vdc	0.15 A	250 Vdc	0.15 A

Connected/Closed Switch (EF)

This switch combines the “device connected” and “device closed” information to produce “circuit closed” information. The connected/closed switch (EF) is supplied as an option and must be used with an additional auxiliary switch (OF) and fits into its connector (it is not available for ring terminals).

Connected/Closed Switch (EF) NW only

Table 40: Connected/Closed Switch Characteristics

Circuit Breaker Type	**NW (not available for NT)**			
Maximum Number of Contacts	8a/8b Form C			
	Standard: 100 mA/24 V Minimum Load		Low-Level: 2 mA/15 V Minimum Load	
Breaking Capacity at a Power Factor (p.f.) of 0.3	240/380 Vac	6 A	24/48 Vac	5 A
	480 Vac	6 A	240 Vac	5 A
	600/690 Vac	6 A	380 Vac	5 A
	24/48 Vdc	2.5 A	24/48 Vdc	2.5 A
	125 Vdc	0.8 A	125 Vdc	0.8 A
	250 Vdc	0.3 A	250 Vdc	0.3 A

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Cradle Position Switch

Three series of optional auxiliary switches are available for the cradle:

- Cradle position switches (CE) to indicate the connected position.
- Cradle position switches (CD) to indicate the disconnected position. This position is indicated when the required clearance for isolation of the power and auxiliary circuits is reached.
- Cradle position switches (CT) to indicate the test position. In this position, the power circuits are disconnected and the auxiliary circuits are connected.

Cradle Position Switch (CE, CD, CT)

Table 41: Cradle Position Switch Characteristics

Circuit Breaker Type			NT			NW		
			CE	CD	CT	CE	CD	CT
Maximum Push-In Switches with Standard Actuators			3	2	1	3[1]	3[1]	3[1]
With Additional Actuators						9	0	0
						6	3	0
						3	6	0
						6	0	3
Breaking Capacity at a Power Factor (p.f) of 0.3	Standard (100 mA/24 V minimum load)							
	Vac	240	8 A			8 A		
		380	8 A			8 A		
		480	8 A			8 A		
		600/690	6 A			6 A		
	Vdc	24/48	2.5 A			2.5 A		
		125	0.8 A			0.8 A		
		250	0.3 A			0.3 A		
	Low-Level (2 mA/15 V minimum load)							
	Vac	24/48	5 A			5 A		
		240	5 A			5 A		
		380	5 A			5 A		
	Vdc	24/48	2.5 A			2.5 A		
		125	0.8 A			0.8 A		
		250	0.3 A			0.3 A		

[1] **Possible Ring-Terminal Combinations**

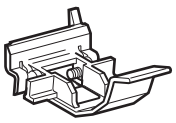
CE	CD	CT
1b	1a	1b
1b	1a, 1b	1b
1a, 2b	1a, 2b	1a
1a, 2b	2a, 1b	1b
2a, 1b	1a, 2b	1b
1a	1a	1a
3a	3a	1a
3b	3b	1b

Additional Actuators for Cradle Position Switches on Masterpact NW Circuit Breakers

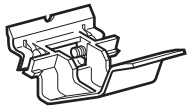
A set of additional actuators may be installed on the cradle to change or add the functions of the cradle position switches. Each standard actuator can be replaced by any other actuator to change the function of the cradle position switch.

Figure 11: Cradle Position Switch Actuators

Actuator for up to Three CE Switches (standard)



Actuator for up to Three CD Switches (standard)



Actuator for up to Three CT Switches (standard)

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Micrologic Trip Unit Accessories

External Neutral Current Transformer (CT)

The sensor is installed on the neutral conductor for neutral protection and metering and residual current ground-fault protection for equipment.

NOTE: The rating of the external neutral current transformer must be compatible with the rating of the circuit breaker.

External Neutral Current Transformer (CT)

External Sensor for Source Ground-Return (SGR) and Modified Differential Ground-Fault (MDGF) Protection

NOTE: MDGF and SGR are for use on circuit breakers with 400 A and higher sensors.

For SGR System: The sensor is installed around the connection of the transformer neutral point to ground and connects to the Micrologic 6.0A, 6.0P or 6.0H trip units. SGR requires a modified differential ground-fault (MDGF) sensor and MDGF interface module to connect to the trip unit.

For MDGF System: An MDGF sensor is installed on each phase and neutral of each circuit breaker and connects to the Micrologic trip unit through an MDGF module. See MDGF Instruction Bulletin 48049-182.

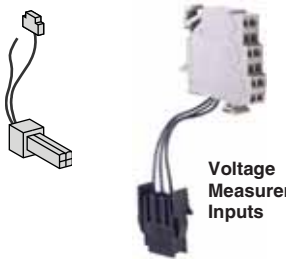
Metering Current Transformers (CTs)

Metering current transformers are optional and are mounted on the NW UL or ANSI cradle. They permit connection to the standard metering device. All metering transformers are accurate with the 0.3% accuracy class, 5 A output ratio at full load (for example, a 1600 A metering CT would send 5 A at the full load of 1600 A). A standard wiring harness is also included for factory-installed MCTs. Not available for neutral pole on a 4P circuit breaker. Not available on cradles with ArcBlok™ technology.

Toroidal Current Transformers (CTs) for W-Frame Circuit Breakers

Voltage Measurement Inputs

Voltage measurement inputs are required for power measurements. As standard, the trip unit is supplied by internal voltage measurement inputs placed on the bottom terminals of the circuit breaker. On request, the internal voltage measurement inputs may be replaced by an external source.



Voltage Measurement Inputs

Sensor Plugs

Sensor plugs (standard) are used to set the sensor rating (I_n) of the circuit breaker, are field replaceable and are offered at 50–100% of frame rating. For a complete list of available sensor plugs see selection information in Section 7.

Sensor Plug

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Adjustable Rating Plugs

Eight interchangeable rating plugs are available to limit the long-time threshold setting range for greater versatility.

Adjustable Rating Plug

Table 42: Adjustable Rating Plug Settings

Rating Plug		Switch Settings $I_r = I_n$ x...								
UL Listed/ANSI Certified	Type A[1]	0.4	0.45	0.5	0.6	0.63	0.7	0.8	0.9	1
	Type B	0.4	0.44	0.5	0.56	0.63	0.75	0.88	0.95	1
	Type C	0.42	0.50	0.53	0.58	0.67	0.75	0.83	0.95	1
	Type D	0.4	0.48	0.64	0.7	0.8	0.9	0.93	0.95	1
	Type E	0.6	0.7	0.75	0.8	0.85	0.9	0.93	0.95	1
	Type F	0.84	0.86	0.88	0.9	0.92	0.94	0.96	0.98	1
	Type G	0.66	0.68	0.7	0.72	0.74	0.76	0.78	0.8	0.82
	Type H	0.48	0.5	0.52	0.54	0.56	0.58	0.6	0.62	0.64
IEC Rated	Type R[1]	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
	Type S	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8
	Type T	0.8	0.82	0.85	0.88	0.9	0.92	0.95	0.98	1
	Type P (off plug)	No long-time protection.								

[1] Standard

External Power Supply Module

Power supply modules are available in six input voltages: 24/30 Vdc, 48/60 Vdc, 125 Vdc, 110/130 Vac, 200/240 Vac, and 380/415 Vac (all +10%, -15%). The output voltage for each is 24 Vdc; the output power is 5 VA/5 W (ripple < 5%). The modules are not UL Listed.

When used with the Micrologic A, P, and H trip units, a power supply module makes it possible to:

- Display currents less than 20% of sensor (I_n).
- Maintain display of tripping causes after opening of the circuit breaker (P and H trip units only).
- Store the value of the interrupted current (P and H trip units only).
- Power the M2C module (P and H trip units only).

External Power Supply Module

External Battery Backup Module

The external battery backup module provides up to 12 hours of backup power for the power supply module.

External Battery Backup Module

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M2C/M6C Programmable Contact Modules

These contacts are used with the Micrologic P and H control units, and indicate the type of fault and instantaneous or delayed threshold overruns (i.e trip unit protection pick-up, current/voltage unbalance, under/over voltage, reverse power, phase rotation, under/over frequency, and load shedding). The M2C unit is powered from the control unit's 24 Vdc source (100 mA consumption); the M6C unit requires an external 24 Vdc power supply (100 mA consumption).

They are programmed via the control unit using a keypad or via a supervisory station with the COM communication option. They may be programmed:

- with instantaneous return to the initial state;
- without return to the initial state;
- with return to the initial state following a delay.

M6C Programmable Contact Module

M2C Programmable Contact Module

Table 43: Characteristics for M2C/M6C Programmable Contacts

Minimum Load		**100 mA/24 V**
Breaking Capacity at a Power Factor (p.f.) of 0.7	240 Vac	5 A
	380 Vac	3 A
	24 Vdc	1.8 A
	48 Vdc	1.5 A
	125 Vdc	0.4 A
	250 Vdc	0.15 A

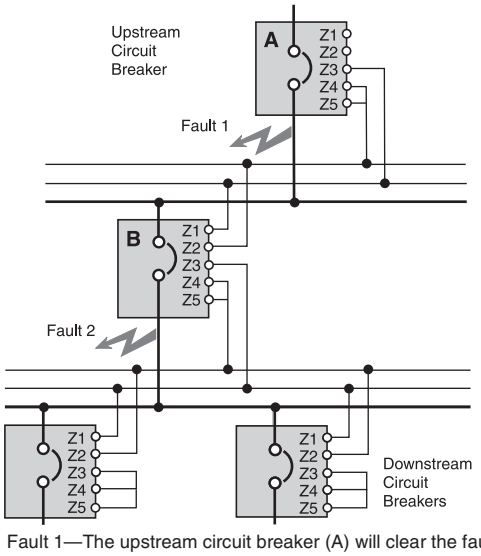
Zone-Selective Interlocking (ZSI)

Zone-selective interlocking (ZSI) is used to reduce the stress on electrical distribution equipment during fault conditions by reducing the time it takes to clear the fault, while maintaining system coordination between overcurrent protective devices.

During a short-circuit or ground-fault condition on a ZSI system, the device directly ahead of the fault sends a signal upstream via control wiring to restrain upstream circuit breakers from tripping and then trips with no intentional time delay to clear the fault. Upstream devices which receive a restraint signal obey their short-time and/or ground-fault delay settings to maintain coordination in other areas of the system. Upstream devices that do not receive a restraint signal trip with no intentional time delay.

For ZSI to work, trip settings must be coordinated so a downstream circuit breaker will trip before an upstream circuit breaker under overload, short-circuit or ground-fault conditions. (Effective coordination requires a system coordination study.)

Example of Zone-Selective Interlocking



Fault 1—The upstream circuit breaker (A) will clear the fault with no intentional delay, regardless of its time-delay setting.

Fault 2—Circuit breaker (B) will inform upstream circuit breaker (A) that it is clearing the fault. This will prevent circuit breaker (A) from tripping instantaneously. Circuit breaker (A) will trip at the end of its time delay setting if the fault is not cleared during this time.

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Restraint Interface Module (RIM)

The restraint interface module (RIM) is used to allow zone-selective interlocking communications between circuit breakers with old Square D™ Micrologic, Merlin Gerin™, or Federal Pioneer™ trip units and GC series ground-fault relays.

Downstream circuit breakers with Micrologic 2.0A, 5.0A, 5.0P, 5.0H, 6.0A, 6.0P, and 6.0H trip units can restrain up to 15 upstream circuit breakers with Micrologic 5.0A, 5.0P, 5.0H, 6.0A, 6.0P and 6.0H trip units without requiring a restraint interface module. If the number of upstream circuit breakers exceeds 15, then a RIM is required.

Restraint Interface Module (RIM)

Table 44: RIM Requirements

Downstream Device (sends output to RIM) \ Upstream Device (receives output to RIM)	Micrologic Trip Unit[1]	Micrologic Series B Trip Unit	Square D GC-100 Relay	Square D GC-200 Relay	Merlin Gerin STR58 Trip Units	Federal Pioneer USRC and USRCM Trip Units
Micrologic Trip Unit[1]	15[2]	R	R	15	15	R
Square D Micrologic Series B Trip Units	R	26	R	R	R	15
Square D GC-100 Relay	R	R	7	R	R	R
Square D GC-200 Relay	15	R	R	15	15	R
Merlin Gerin STR58 Trip Units	15	R	R	15	15	R
Merlin Gerin STR53 Trip Units	15	R	R	15	15	R
Federal Pioneer USRC and USRCM Trip Units	R	15	R	R	R	15
Square D Add-On Ground Fault Module for Equipment Protection	R	5	R	R	R	R

R Denotes that a Restraint Interface Module (RIM) is required.

1 Includes 2.0A (as a downstream trip unit only), 5.0A, 5.0P, 5.0P, 5.0H, 6.0A, 6.0P, and 6.0H trip units.

2 Number denotes maximum number of upstream circuit breakers that can be restrained without requiring a RIM.

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Cradle Connections

Table 45: Masterpact NW UL Listed/ANSI Certified 3P/4P Drawout Circuit Breakers (Rear Connections)

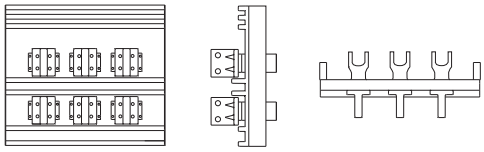
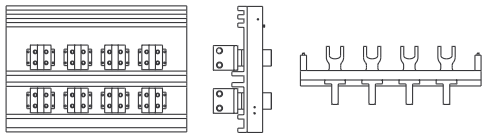
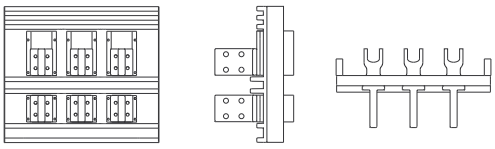
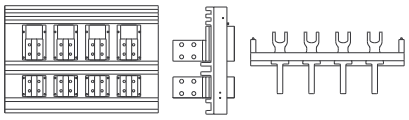
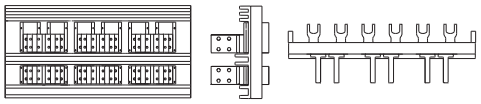
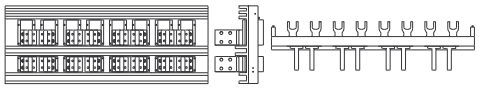
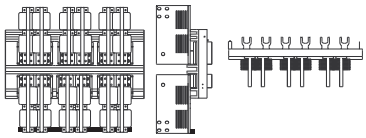
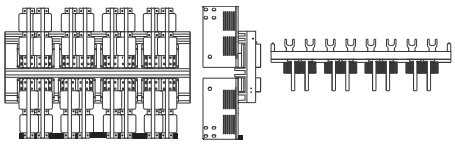
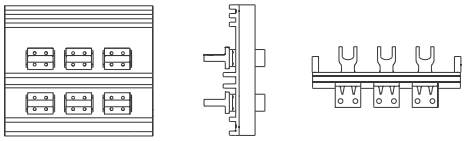
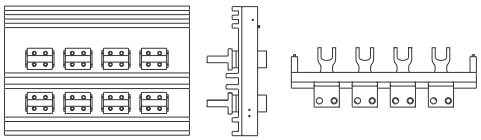
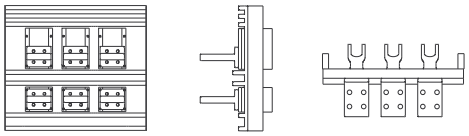
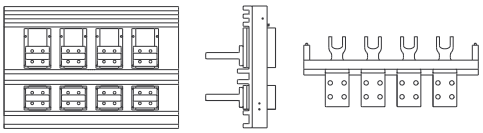
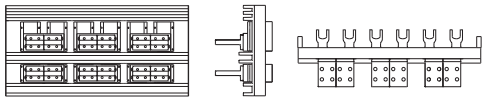
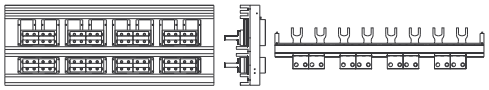
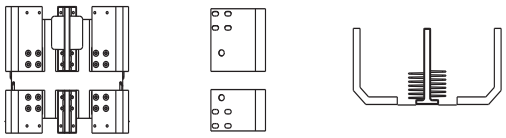
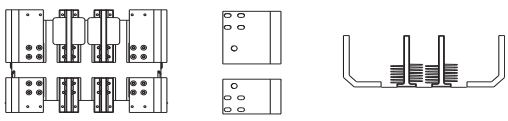
Connector Type	Ampere Rating	3P Layout (Back/Side/Top)	4P Layout (Back/Side/Top)
Rear-Connected "T" Vertical (RCTV)	800 to 2000 A		
	2500 to 3000 A		
	3200 A (L1) 4000 to 5000 A		
	6000 A		
Rear-Connected "T" Horizontal (RCTH)	800 to 2000 A		
	2500 to 3000 A		
	3200 A (L1) 4000 to 5000 A		
Rear-Connected Offset Vertical (RCOV)	3200 A 2000 A (L1/L1F)		

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Table 46: Masterpact NW UL Listed/ANSI Certified 3P/4P Drawout Circuit Breakers (Front Connections)

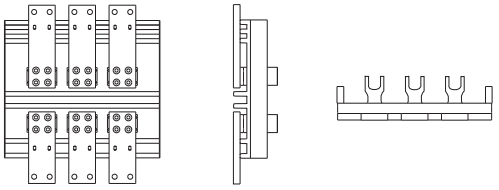
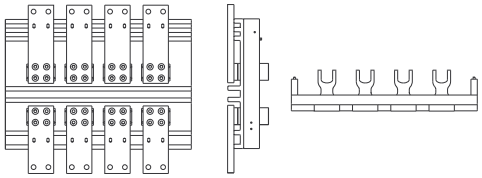
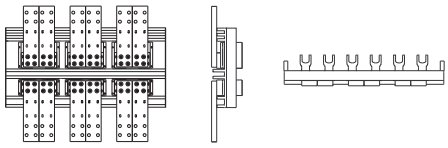
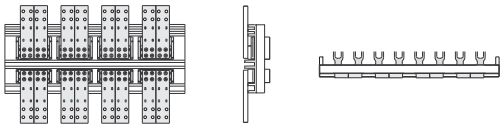
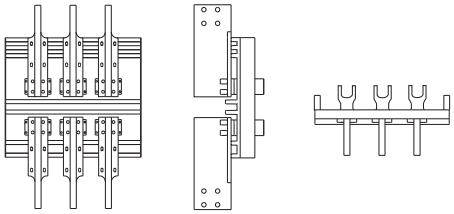
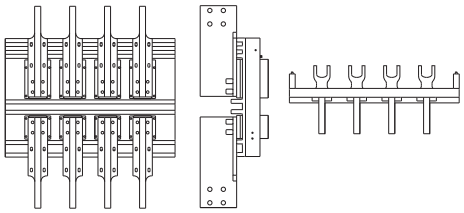
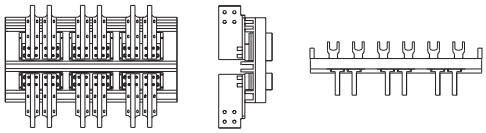
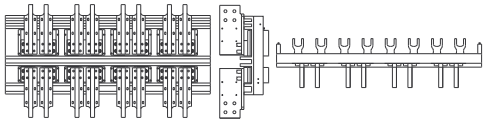
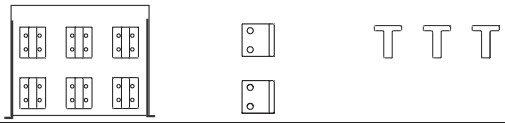
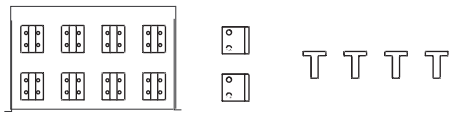
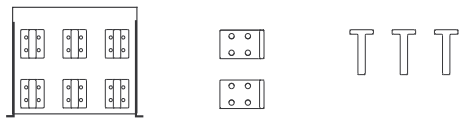
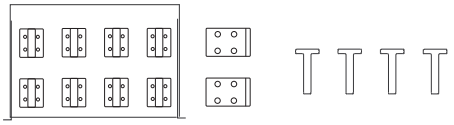
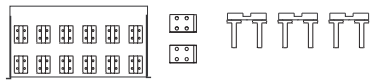
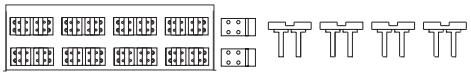
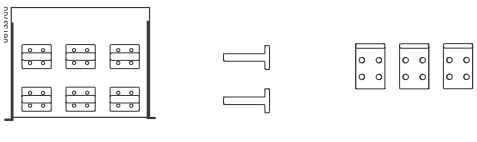
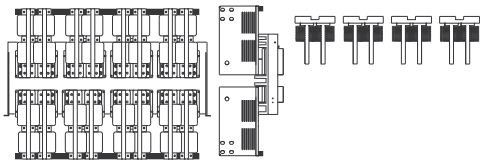
Connector Type	Ampere Rating	3P Layout (Back/Side/Top)	4P Layout (Back/Side/Top)
Front-Connected Flat (FCF)	800 to 2000 A		
	3200 A (L1) 4000 A		
Front-Connected "T" (FCT)	800 to 3000 A		
	3200 A (L1) 4000 to 5000 A		

Table 47: Masterpact NW UL Listed/ANSI Certified 3P/4P Fixed Circuit Breakers (Rear Connections)

Connector Type	Ampere Rating	3P Layout (Back/Side/Top)	4P Layout (Back/Side/Top)
Rear-Connected "T" Vertical (RCTV)	800 to 2000 A		
	2500 to 3000 A		
	4000 to 5000 A		
	6000 A		

Continued on next page

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Table 47: Masterpact NW UL Listed/ANSI Certified 3P/4P Fixed Circuit Breakers (Rear Connections) *(continued)*

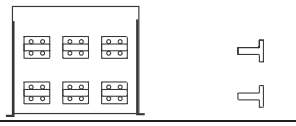
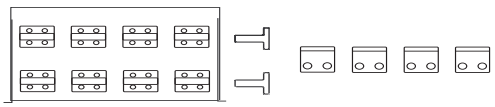
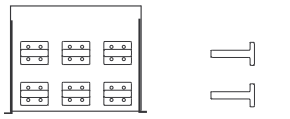
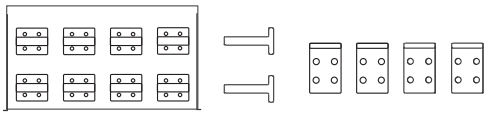
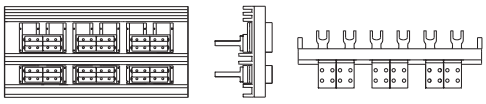
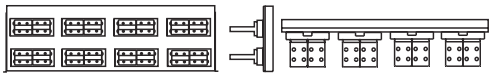
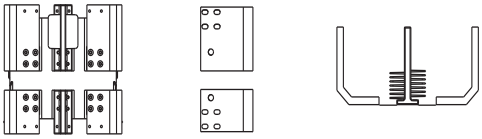
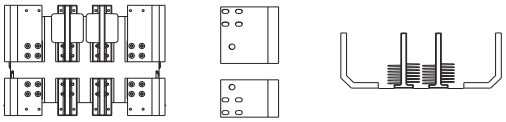
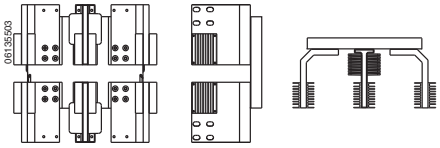
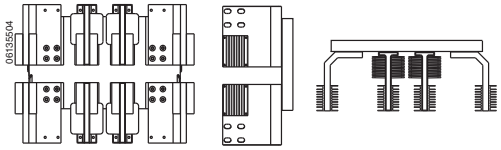
Rear-Connected "T" Horizontal (RCTH)	800 to 2000 A		
	2500 to 3000 A		
	4000 to 5000 A		
Rear-Connected Offset Vertical (RCOV)	3200 A		
Rear-Connected Offset Vertical (Special)	4000 A (B) (W-Frame)		

Table 48: Masterpact NW UL Listed/ANSI Certified 3P/4P Fixed Circuit Breakers (Front Connections)

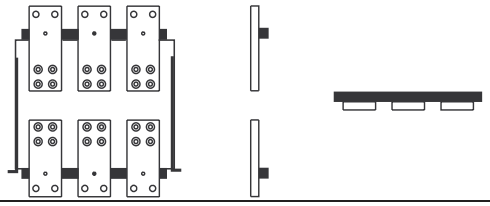
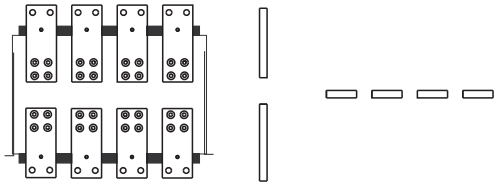
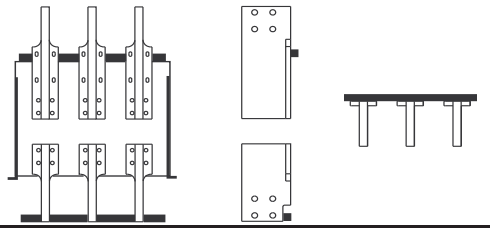
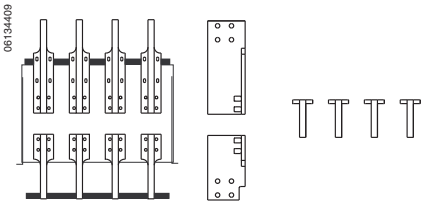
Connector Type	Ampere Rating	3P Layout (Front/Side/Top)	4P Layout (Front/Side/Top)
Front-Connected Flat (FCF)	800 to 2000 A		
Front-Connected "T" (FCT)	800 to 3000 A		

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Table 49: Masterpact NW IEC Rated 3P/4P Drawout Circuit Breakers

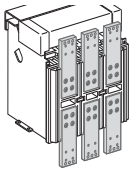
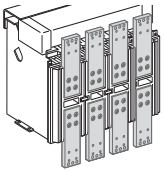
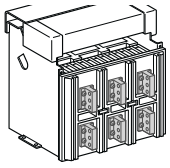
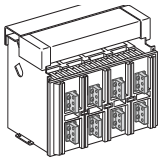
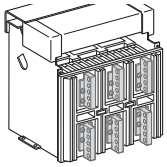
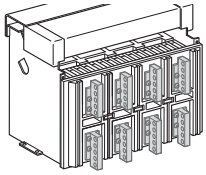
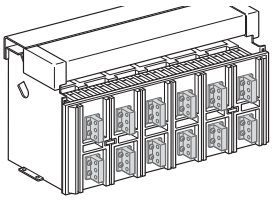
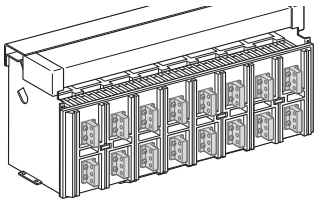
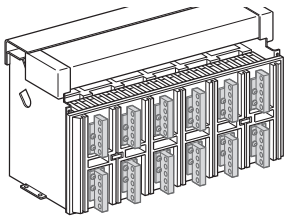
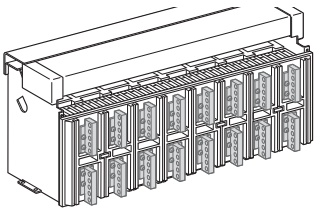
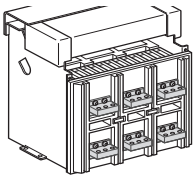
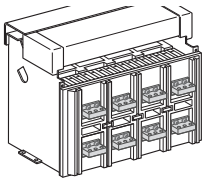
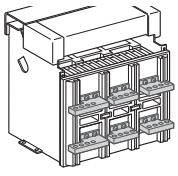
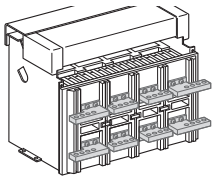
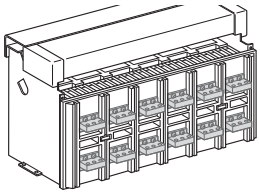
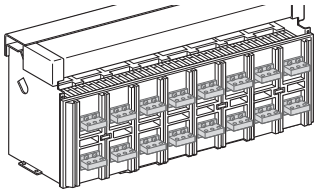
Connector Type	Ampere Rating	3P Layout	4P Layout
Front-Connected Flat (FCF)	800 to 3200 A		
Rear-Connected “T” Vertical (RCTV)	800 to 3200 A		
	4000 A		
	5000 A		
	6300 A		
Rear-Connected “T” Horizontal (RCTH)	800 to 3200 A		
	4000 A		
	4000b, 5000 A		

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Table 50: Masterpact NW IEC Rated 3P/4P Fixed Circuit Breakers

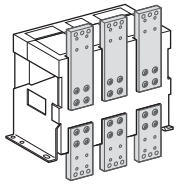
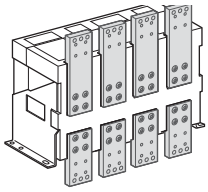
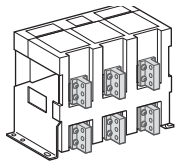
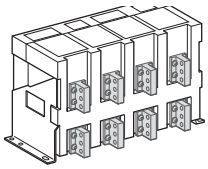
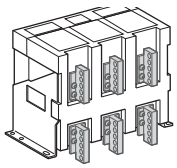
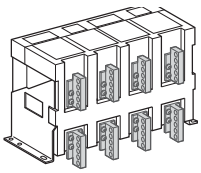
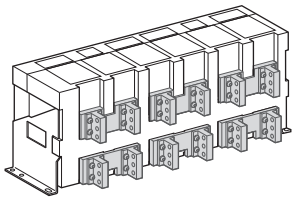
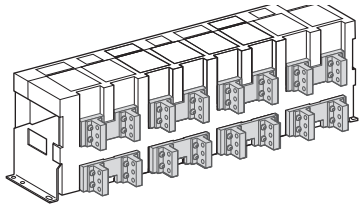
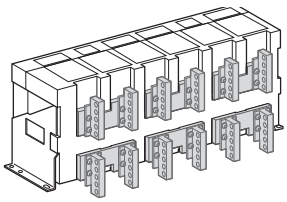
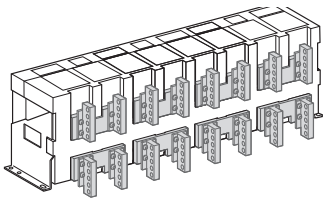
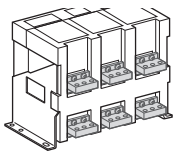
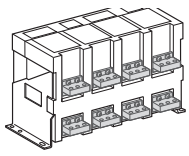
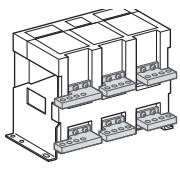
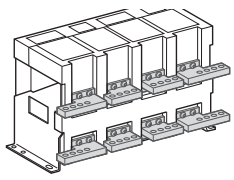
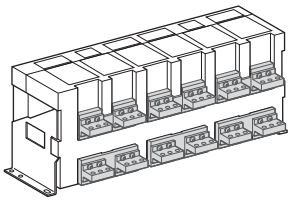
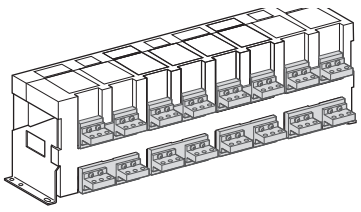
Connector Type	Ampere Rating	3P Layout	4P Layout
Front-Connected Flat (FCF)	800 to 3200 A		
Rear-Connected “T” Vertical (RCTV)	800 to 3200 A		
	4000 A		
	4000b, 5000 A		
	6300 A		
Rear-Connected “T” Horizontal (RCTH)	800 to 3200 A		
	4000		
	4000b, 5000 A		

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Table 51: Masterpact NT UL Listed/ANSI Certified 3P/4P Fixed and Drawout Circuit Breakers

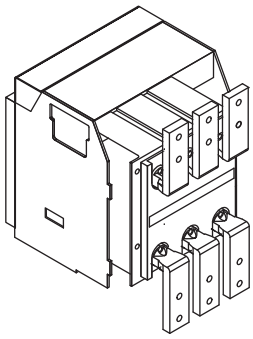
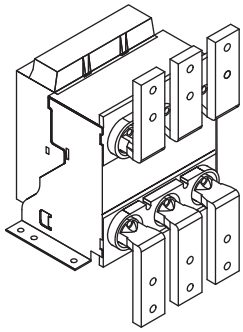
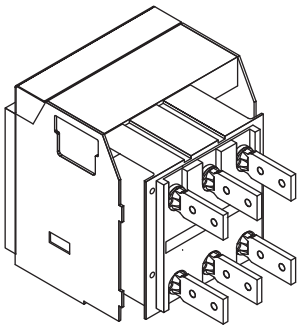
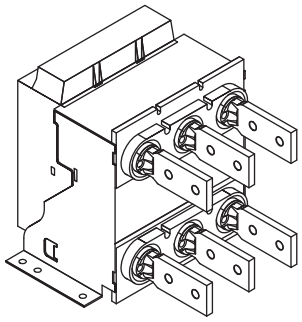
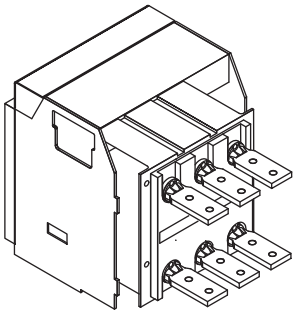
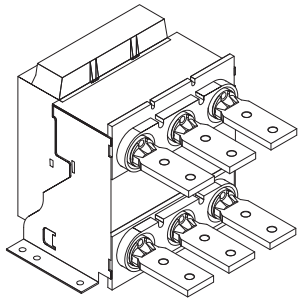
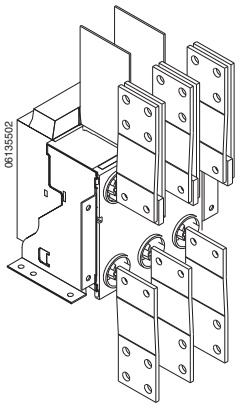
Connector Type	Drawout Circuit Breakers	Fixed Circuit Breakers
Front-Connected Flat (FCF) 800 to 1200 A		
Rear-Connected “T” Vertical (RCTV) 800 to 1200 A		
Rear-Connected “T” Horizontal (RCTH) 800 to 1200 A		
Rear-Connected Vertical 1600 A	N/A	

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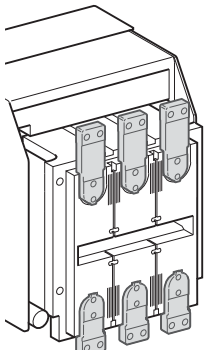
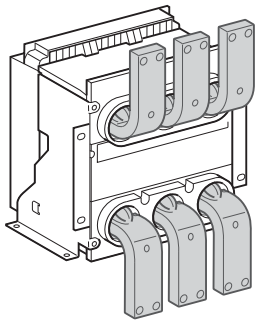
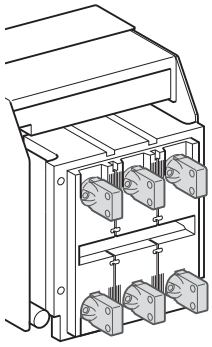
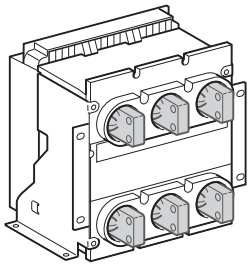
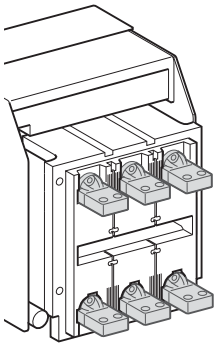
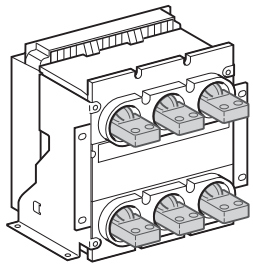
Table 52: Masterpact NT IEC Rated 3P/4P Fixed and Drawout Circuit Breakers

Connector Type	Drawout Circuit Breakers	Fixed Circuit Breakers
Front-Connected Flat (FCF) 800 to 1600 A		
Rear-Connected “T” Vertical (RCTV) 800 to 1600 A		
Rear-Connected “T” Horizontal (RCTH) 800 to 1600 A		

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Test Equipment

Hand-Held Test Kit

The hand held test kit may be used to:

- Verify trip unit operation, the mechanical operation of the circuit breaker, and the electrical continuity of the connection between the trip solenoid and the trip unit.
- Supply control power to the trip unit for settings via the keypad when the circuit breaker is open (Micrologic type A, P or H trip units)
- Inhibit thermal imaging for primary injection test (Micrologic type A, P or H trip units)
- Inhibit ground fault for primary injection test (Micrologic type A, P or H trip units)
- Self-restrain zone-selective interlocking (ZSI)

Hand-Held Test Kit

Full-Function Test Kit

The full-function test kit can be used to verify LSIG functionality.

- Optional
- Can be used to check trip unit operation, for example:
  - — Display of settings
  - — Operating tests on the electronic component
  - — Automatic and manual tests on protection functions (trip curve verification)
  - — Tests on the zone-selective interlocking (ZSI) functions
  - — Inhibit thermal imaging for primary injection testing
  - — Self-restrain zone-selective interlocking (ZSI)
- Can also be used to:
  - — Check mechanical operation of the circuit breaker
  - — Check the electrical continuity of connection between the trip solenoid and the trip unit
  - — Print the trip unit and circuit breaker test report when used in conjunction with a PC FFTK report generator software (cat. no. FFTKRPT-V1-0) is required

Full-Function Test Kit

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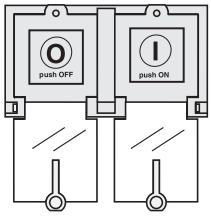
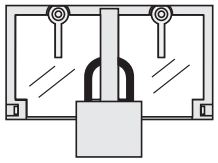
Circuit Breaker Locking and Interlocking

Lockable Push Button Cover

A transparent cover blocks access to the push buttons used to open and close the device. It is possible to independently lock the opening button and/or the closing button. The push buttons may be locked using:

- One to three padlocks: 3/16” to 5/16” diameter, not supplied
- Wire seal
- Two screws





Push Button Lock

Open Position Padlock and Key Lock Provisions

The circuit breaker is locked in the off position by physically keeping the opening push button pressed down using one of the following:

- One to three padlocks: 3/16” to 5/16” diameter, not supplied.
- Key locks: One or two Kirk® key locks (keyed alike or differently) are available for UL Listed/ANSI Certified circuit breakers; for IEC Rated circuit breakers, Ronis, Castell, or Profalux key locks are available. (Masterpact NT circuit breakers may have only one key lock on the circuit breaker.)

Open Position Key Lock (NW)

Open Position Padlock Provision (NW)

Keys may be removed only when locking is effective. The key locks are available in any of the following configurations:

- One key lock
- One key lock mounted on the device plus one identical key lock supplied separately for interlocking with another device
- Two different key locks mounted on the circuit breaker for double locking

A locking kit for installation of one or two key locks may be ordered separately.

Table 53: Circuit Breaker and Switch Locking Options

Type of Locking		Maximum Number of Locks
Pushbutton Locking	Using padlocks	Three padlocks
Open Position Locking	Using key locks	Two key locks (optional)
	Using padlocks and key locks	Up to three padlocks and two key locks (optional)

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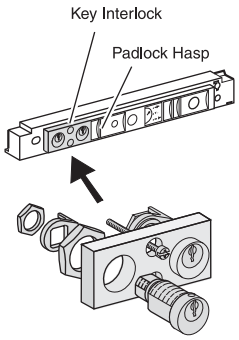
Cradle Locking and Interlocking

Disconnected Position Locking

The circuit breaker can be locked in the disconnected position by key interlock (optional) or padlock (standard). The key interlock is on the cradle and accessible with the door locked.

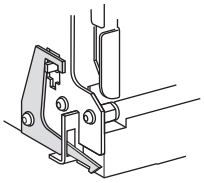
- Kirk key interlocks are available for UL/ANSI circuit breakers; for IEC circuit breakers, Ronis, Castell, or Profalux key locks are available. Captive key when unlocked.
- Locking on disconnected, test, and connected positions is optional for IEC circuit breakers and standard for UL/ANSI circuit breakers.



Disconnected Position Locking Provisions

Door Interlock (VPEC)

The door interlock prevents the compartment door from being opened when the circuit breaker is in the connected or test position. If the circuit breaker is put into the connected position with the door open, the door can be closed without disconnecting the circuit breaker. For greater protection, this interlock can be used in conjunction with the open door racking interlock.



Door Interlock (NW)

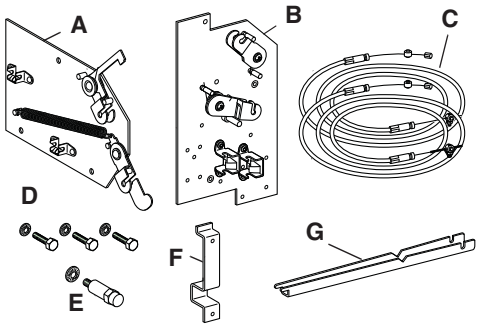
Racking Interlock Between Racking Handle and Off Position (IBPO)

The racking interlock is standard for UL and ANSI circuit breakers, and optional for IEC circuit breakers. It prevents insertion of the racking handle unless the OFF push button is pressed. Not available for IEC Rated Masterpact NT circuit breakers.

Cable Door Interlock Kit

This option prevents the compartment door from being opened when the circuit breaker is in the closed position. This kit includes:

Figure 12: Cable Door Interlock Kit Contents



Kit Contents

(A) Panel Interlocking Plate
(B) Circuit Breaker Interlocking Plate
(C) Interlocking Cables
(D) Bolts with Washers
(E) Guide-Bolt with Washer
(F) Interlocking Bracket
(G) Calibration Tray

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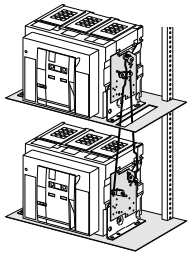
Source Changeover Interlocks

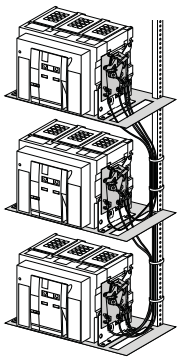
- Source changeover interlocks allow mechanical interlocking between two or three circuit breakers (fixed and drawout).

NOTE: Source changeover interlocks for Masterpact NT circuit breakers are IEC only.

Figure 13: Source Changeover Interlocks



Two NW Circuit Breakers Interlocked Using Rods



Three NW Circuit Breakers Interlocked Using Cables

Interlocking Two Circuit Breakers

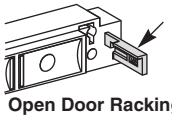
- Interlocking Two Mains Using Rods
- Interlocking Two Mains Using Cables

Interlocking Three Circuit Breakers Using Cables

- Interlocking Two Mains and One Generator
- Interlocking Two Mains and One Tie
- Interlocking Three Mains

Open Door Racking Interlock (VPOC)

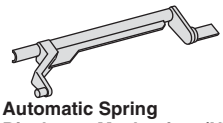
The racking interlock prevents racking in the circuit breaker when the door is open. (Insertion of the circuit breaker racking handle is not possible when the compartment door is open.)



Open Door Racking Interlock (NW)

Automatic Spring Discharge Mechanism (DAE)

The automatic spring discharge mechanism is standard for UL and ANSI circuit breakers, and optional for IEC circuit breakers. It releases the closing spring energy when the circuit breaker is moved from the disconnected position to the fully withdrawn position. Not available for IEC Rated Masterpact NT circuit breakers.

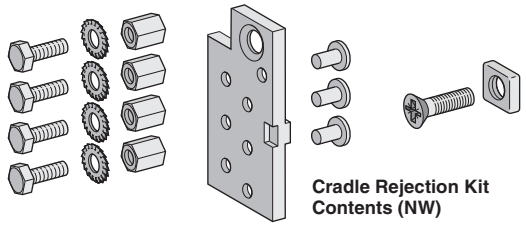


Automatic Spring Discharge Mechanism (NW)

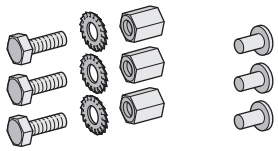
Cradle Rejection Kits

The cradle rejection feature (standard) ensures that only the properly designated circuit breaker or switch is matched with the selected cradle assembly.

Figure 14: Cradle Rejection Kits



Cradle Rejection Kit Contents (NW)



Cradle Rejection Kit Contents (NT)

Rail Padlocking

Rail padlocking is standard for UL, ANSI, and IEC cradles. When used in combination with the disconnected position locking device, rail padlocking prevents the movement of the circuit breaker from the disconnected position to the fully withdrawn position when the padlock hasp is pulled out and locked.

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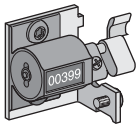
Miscellaneous Accessories

Mechanical Operation Counter (CDM)

The mechanical operation counter (CDM) registers the total number of operating cycles. One CDM is installed per circuit breaker.



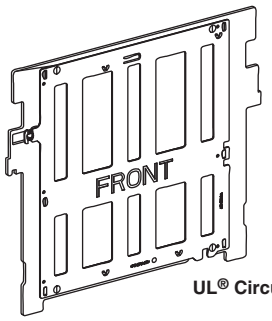
Mechanical Operation Counter (CDM)

Shutter and Shutter Lock

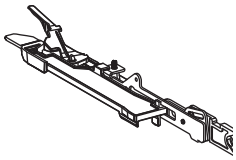
The shutters automatically block access to the main disconnects when the circuit breaker is in the disconnected, test, or fully withdrawn position.

The shutter lock is used to prevent connection of the circuit breaker or to lock the shutters in the closed position.

Not available on cradles with ArcBlok technology.



UL® Circuit Breaker Shutter

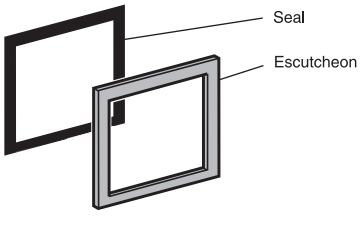


Shutter Lock

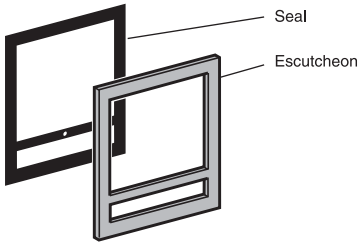
Door Escutcheon (CDP)

These door escutcheons provide a frame and seal for the circuit breaker.

Figure 15: Door Escutcheons



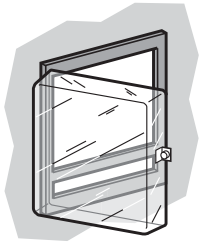
Door Escutcheon (NW Fixed)



Door Escutcheon (NW Drawout)

Transparent Cover (CCP) for Door Escutcheon

The cover is hinged-mounted and locked with a milled head, and is designed to be installed on the door escutcheon.



Transparent Cover (CCP)

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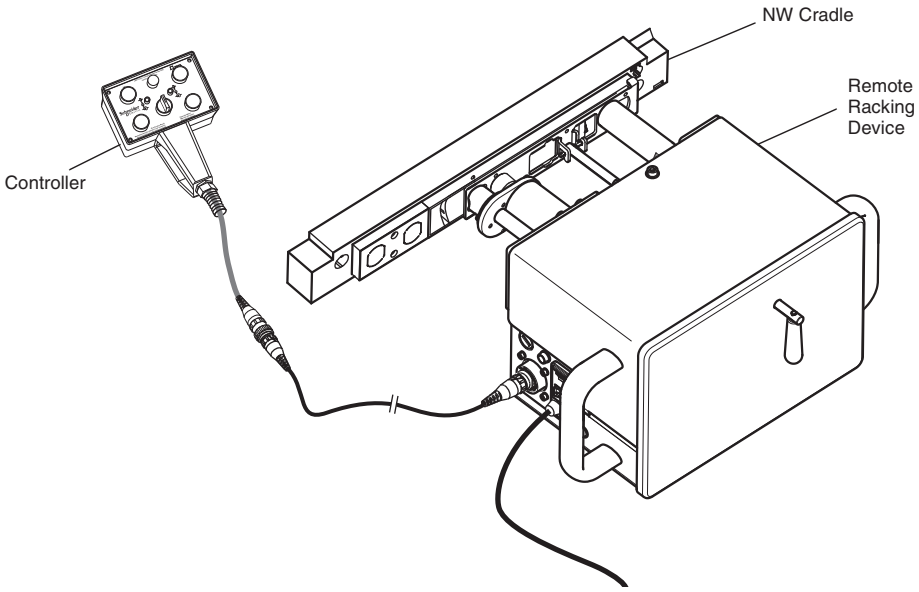
Masterpact NW Remote Racking Device

The remote racking device allows the operator to perform circuit breaker racking operations from a distance of up to 30 ft away from the circuit breaker using the controller. This distance exceeds the arc flash boundary described in the arc flash safety guidelines outlined in NFPA-70E.



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Section 4—Wiring Diagrams

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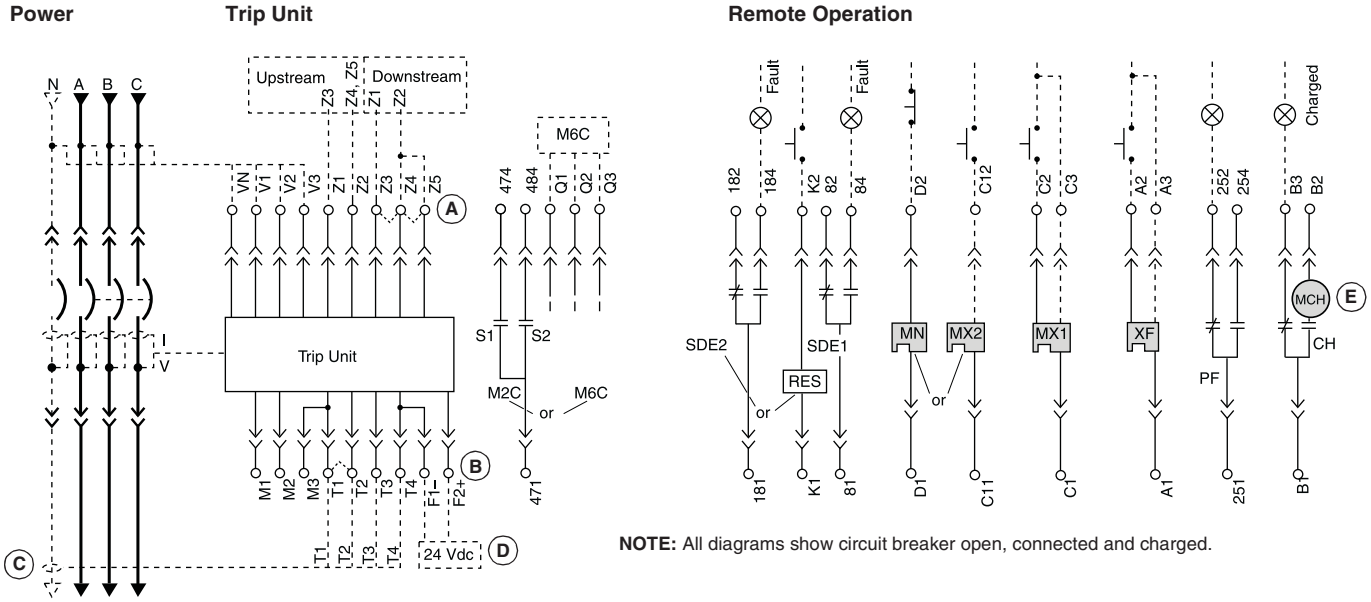
Wiring Diagrams for Masterpact™ NW Circuit Breakers

Figure 16: Wiring Diagrams for Masterpact NW Circuit Breakers



NOTE: All diagrams show circuit breaker open, connected and charged.

A—Do not remove factory-installed jumpers between Z3, Z4 and Z5 unless ZSI is connected.

B—Do not remove factory-installed jumper between T1 and T2 unless neutral CT is connected. Do not install jumper between T3 and T4.

C—For proper wiring of neutral CT, refer to Instrucion Bulletin 48041-082-01 shipped with it.

D—24 Vdc power supply for trip unit must be separate and isolated from 24 Vdc power supply for communication modules.

E—When remote operation features are used, make sure there is a minimum of four seconds for the spring charging motor (MCH) to completely charge the circuit breaker closing springs prior to actuating the shunt close (XF) device.

Table 54: Markings for Push-In Type Terminals

Cell Switches			Trip Unit								Cell Switches			Remote Operation				
CD3	CD2	CD1	COM	UC1	UC2	UC3	UC4	M2C/M6C	SDE2/RES	SDE1	CE3	CE2	CE1	MN/MX2	MX1	XF	PF	MCH
834	824	814	E5 E6	Z5 M1	M2 M3	F2+	V3	484/Q3	184/K2	84	334	324	314	D2/C12	C2	A2	254	B2
832	822	812	E3 E4	Z3 Z4	T3 T4	VN	V2	474/Q2	182	82	332	322	312	C13	C3	A3	252	B3
831	821	811	E1 E2	Z1 Z2	T1 T2	F1–	V1	471/Q1	181/K1	81	331	321	311	D1/C11	C1	A1	251	B1

or

CE6	CE5	CE4
364	354	344
362	352	342
361	351	341

Table 55: Markings for Ring Terminals

Cell Switches			Trip Unit									Remote Operation				
CD3	CD2	CD1	COM	UC1	UC2	UC3	UC3a	M2C/M6C	SDE2/RES	SDE2a	SDE1	SDE1a	MN/MX2	MX1	MX1a	XF	XFa
834/832	824/822	814/812	E5 E6	Z5 M1	M2 M3	F2+	VN	484/Q3	184/K2	182	84	82	D2/C12	C2	C3	A2	A3
831	821	811	E3 E4	Z3 Z4	T3 T4	F1–		471/Q1	181/K1		81		D1/C11	C1		A1	
			E1 E2	Z1 Z2	T1 T2												

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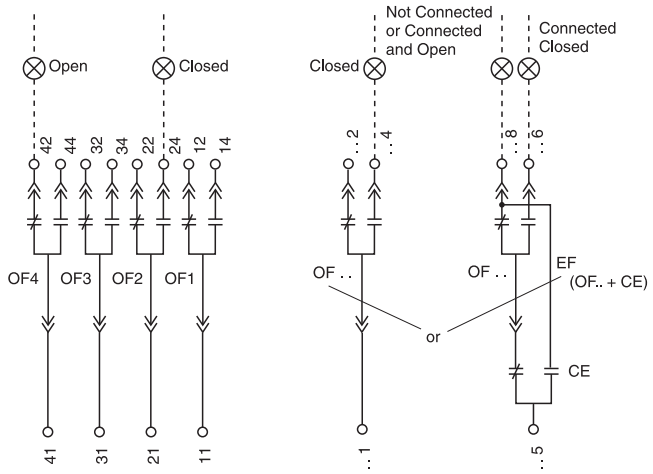
Auxiliary Contacts



Cell Switches

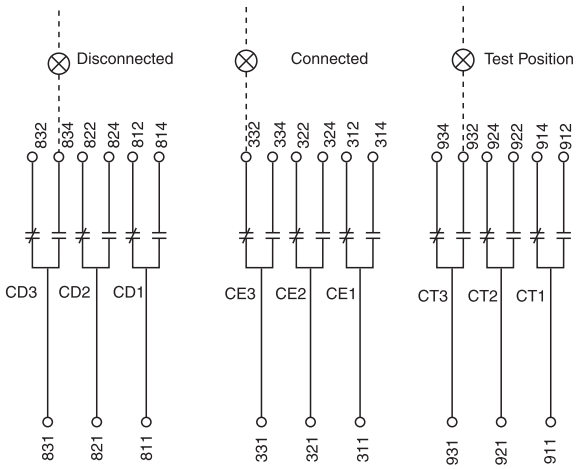


Table 56: Markings for Push-In Type Terminals

Auxiliary Contacts												Cell Switches[1]		
OF24	OF23	OF22	OF21	OF14	OF13	OF12	OF11	OF4	OF3	OF2	OF1	CT3	CT2	CT1
244	234	224	214	144	134	124	114	44	34	24	14	934	924	914
242	232	222	212	142	132	122	112	42	32	22	12	932	922	912
241	231	221	211	141	131	121	111	41	31	21	11	931	921	911
or				or								or		
EF24	EF23	EF22	EF21	EF14	EF13	EF12	EF11					CD6	CD5	CD4
248	238	228	218	148	138	128	118					864	854	844
246	236	226	216	146	136	126	116					862	852	842
245	235	225	215	145	135	125	115					861	851	841

or		
CE9	CE8	C7
394	384	374
392	382	372
391	381	371

[1] Fixed-mounted circuit breaker does not have cell switches (CE, CD, CT).

Table 57: Markings for Ring Terminals

Alarm Switches			
PF	CT1	MCH	MCHa
252	914/912	B2	B3
251	911	B1	

Auxiliary Contacts							
OF14	OF13	OF12	OF11	OF4	OF3	OF2	OF1
144	134	122	112	44	34	22	12
141	131	121	111	41	31	21	11

Cell Switches[1]		
CE3	CE2	CE1
334/332	324/322	314/312
331	321	311

[1] Fixed-mounted circuit breaker does not have cell switches (CE, CD, CT).

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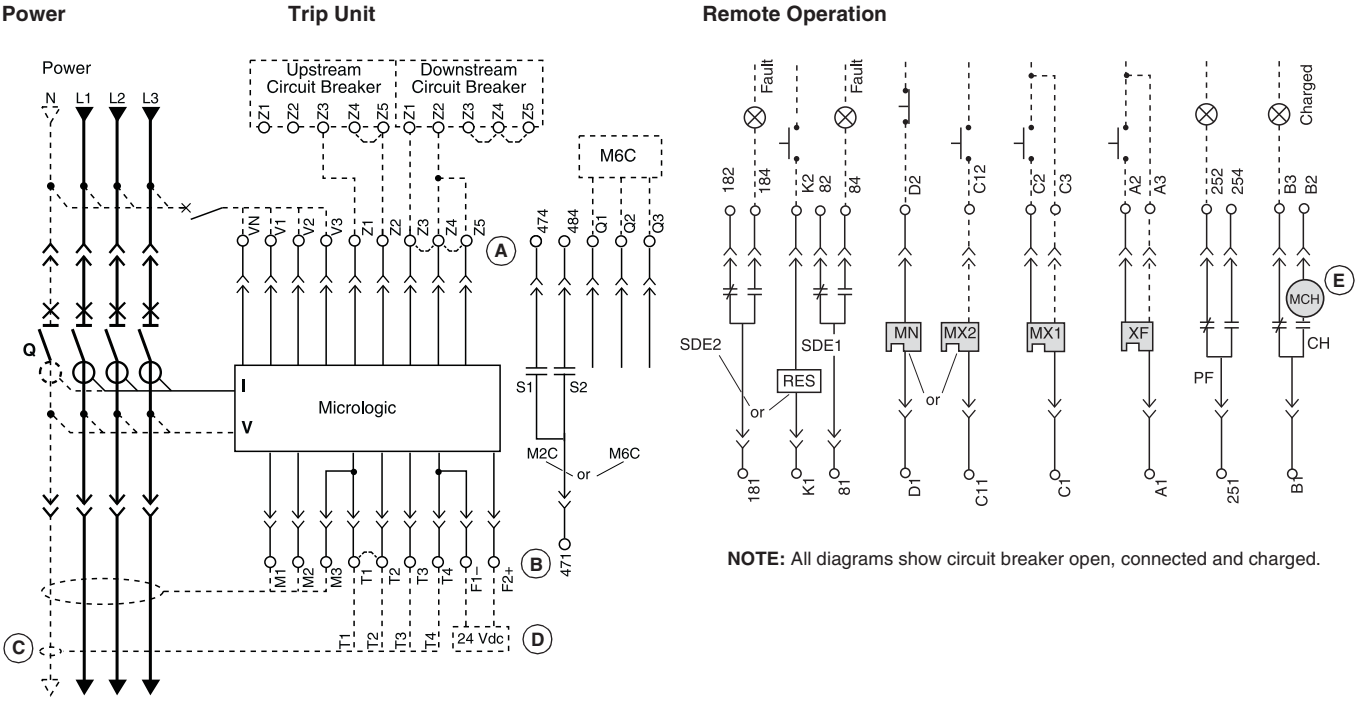
Wiring Diagrams for Masterpact NT Circuit Breakers

Figure 17: Markings for Push-In Type Terminals



NOTE: All diagrams show circuit breaker open, connected and charged.

A—Do not remove factory-installed jumpers between Z3, Z4 and Z5 unless ZSI is connected.
B—Do not remove factory-installed jumper between T1 and T2 unless neutral CT is connected. Do not install jumper between T3 and T4.
C—For proper wiring of neutral CT, refer to Instrucion Bulletin 48041-082-01 shipped with it.
D—24 Vdc power supply for trip unit must be separate and isolated from 24 Vdc power supply for communication modules.
E—When remote operation features are used, make sure there is a minimum of four seconds for the spring charging motor (MCH) to completely charge the circuit breaker closing springs prior to actuating the shunt close (XF) device.

Table 58: Markings for Push-In Type Terminals

Cell Switches		Trip Unit						
CD2	**CD1**	**COM**	**UC1**	**UC2**	**UC3**	**UC4 / M2C / M6C**	**SDE2 / RES**	**SDE1**
824	814	E5 E6	Z5 M1	M2 M3	F2+	V3 / 484 / Q3	184 / K2	84
822	812	E3 E4	Z3 Z4	T3 T4	VN	V2 / 474 / Q2	182	82
821	811	E1 E2	Z1 Z2	T1 T2	F1–	V1 / 471 / Q1	181 / K1	81

Remote Operation				
MN / MX2	**MX1**	**XF**	**PF**	**MCH**
D2 / C12	C2	A2	254	B2
C13	C3	A3	252	B3
D1/C11	C1	A1	251	B1

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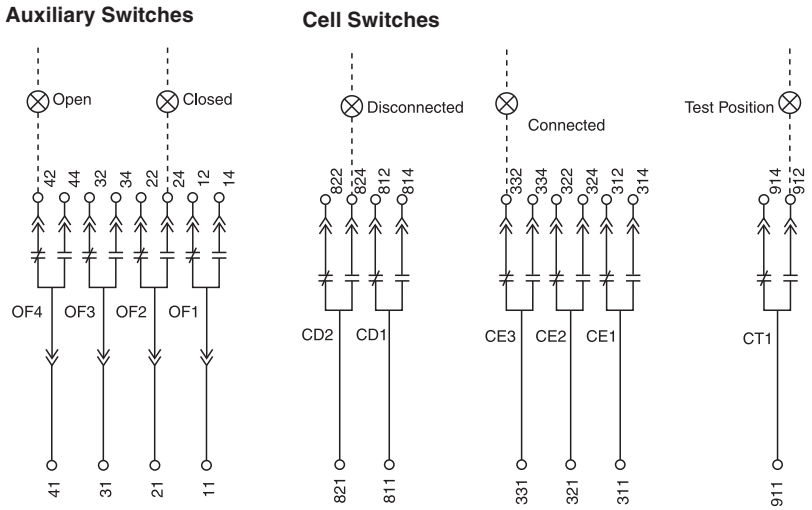
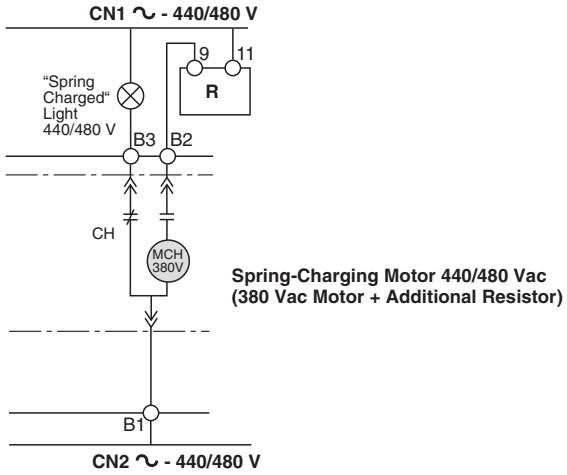


Table 59: Markings for Push-In Type Terminals

Auxiliary Switches			
OF4	**OF3**	**OF2**	**OF1**
44	34	24	14
42	32	22	12
41	31	21	11

Cell Switches			
CE3	**CE2**	**CE1**	**CT1**
334	324	314	914
332	322	312	912
331	321	311	911

Figure 18: Spring-Charging Motor



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Additional Wiring Information for Masterpact NW/NT Circuit Breakers

Alarm Contacts (OF1, OF2, OF3 and OF4 are standard equipment)		
OF4 OF3 OF2 OF1	Open/Closed Circuit Breaker or Switch Position Contacts	OF24: Open/Closed Circuit Breaker or Switch Position Contact or EF24: Combined Connected and Closed Contact
		OF23 or EF23
		OF22 or EF22
		OF21 or EF21
		OF14 or EF14
		OF13 or EF13
		OF12 or EF12
		OF22 or EF22
		OF11 or EF11

Cradle Contacts					
CD3 CD2 CD1	Disconnected Position Contacts	CE3 CE2 CE1	Connected Position Contacts	CT3 CT2 CT1	Test Position Contacts
or				or	
CE6 CE5 CE4	Connected Position Contacts			CE9 CE8 CE7	Connected Position Contacts
				or	
				CD6 CD5 CD4	Disconnected Position Contacts

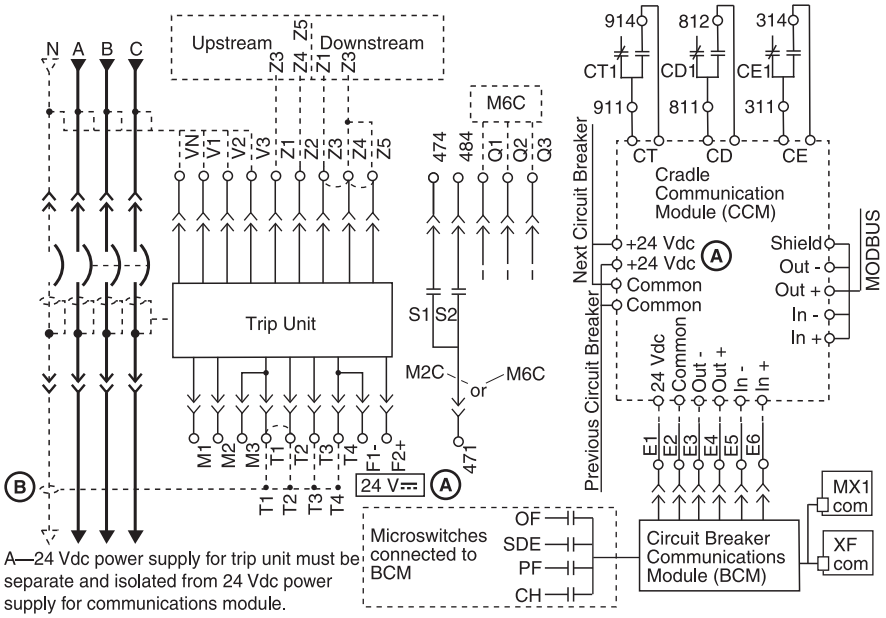
Trip Unit					
Basic	**A**	**P**	**H**		
	X	X	X	Com:	E1–E6 Communication
	X	X	X		Z1–Z5 Logical Selectivity
	X	X	X		Z1 = ZSI OUT
	X	X	X	UC1:	Z2 = ZSI OUT Source; Z3 = ZSI IN Source
	X	X	X		Z4 = ZSI IN Short-Time Delay
	X	X	X		Z5 = ZSI IN Ground Fault
	X	X	X	UC3:	F2+, F1– 24 Vdc External Power Supply
		X	X		External Neutral VN Plug
		X	X	UC4	External Phase Voltage Sensing
		X	X	M2C	Two Programmable Contacts (internal relay)
		X	X	or M6C	Six Programmable Contacts (for connection to external M6C module)

Remote Operation	
SDE2 or RES	Electrical Fault Alarm Contact Remote Reset
SDE1	Electrical Fault Alarm Contact (standard)
MN or MX2	Undervoltage Trip Device Additional Shunt Trip
MX1	Shunt Trip (standard or networked)
XF	Shunt Close (standard or networked)
PF	Ready-to-Close Contact
MCH	Spring-Charging Motor

NOTE: When communication version of the MX1 or XF coils are used, terminals (C3, A3) must be connected to line even if the communications module is not installed.

The bypass circuit through terminal C2/A2 is only momentary duty for 0.5 sec. For continuous duty, use the communications command.

Figure 19: Connection of the Communications Option



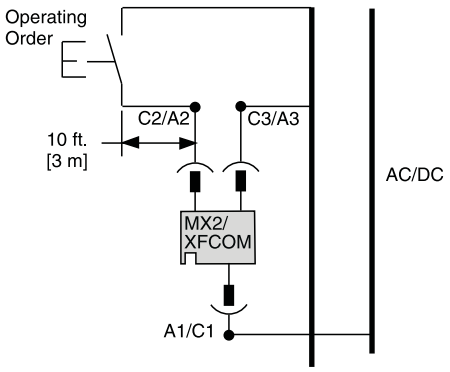
A—24 Vdc power supply for trip unit must be separate and isolated from 24 Vdc power supply for communications module.

B—Refer to instruction bulletin 48041-082 included with neutral CT for the proper wiring.

NOTE: Fixed-mounted circuit breaker does not have cell switches (CE, CD, CT).

NOTE: A recommended wiring schematic for the communicating style shunt trip or shunt close coils is shown below.

Induced voltages in the circuit at terminal C2 and/or A2 can cause the shunt trip or shunt close to not work properly. The best way to prevent the induced voltages is keep the circuit to terminal C2 and A2 as short as possible. If it is impossible to keep the circuit less than 10 feet (3 m), use an interposing relay near terminal C2 or A2.



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Masterpact™ NT Enclosure Information

Table 60: Minimum Enclosure Information

Number of Poles	Circuit Breaker Rating	Circuit Breaker Enclosure Dimensions (H x W x D)		Ventilation Area			
				Top		Bottom	
		in.	mm	$in.^2$	mm^2	$in.^2$	mm^2
3	800 to 1600 A (N, H, L1)	18.25 x 13 x 9.5	463.5 x 330.2 x 241.3	9	5806	9	5806
	800 to 1600 A (L)	62.25 x 23 x 14.75	1581.2 x 584.2 x 374.7	16.5	10645	16.5	10645
4	800 to 1600 A (N, H, L1)	18.25 x 15.8 x 9.5	463.5 x 401.3 x 241.3	9	5806	9	5806
	800 to 1600 A (L)	62.25 x 25.76 x 14.75	1581.2 x 654.2 x 374.7	16.5	10645	16.5	10645

UL®/ANSI 3P Drawout Circuit Breakers

Figure 20: 800–1200 A Masterpact NT 3P Drawout—Master Drawing

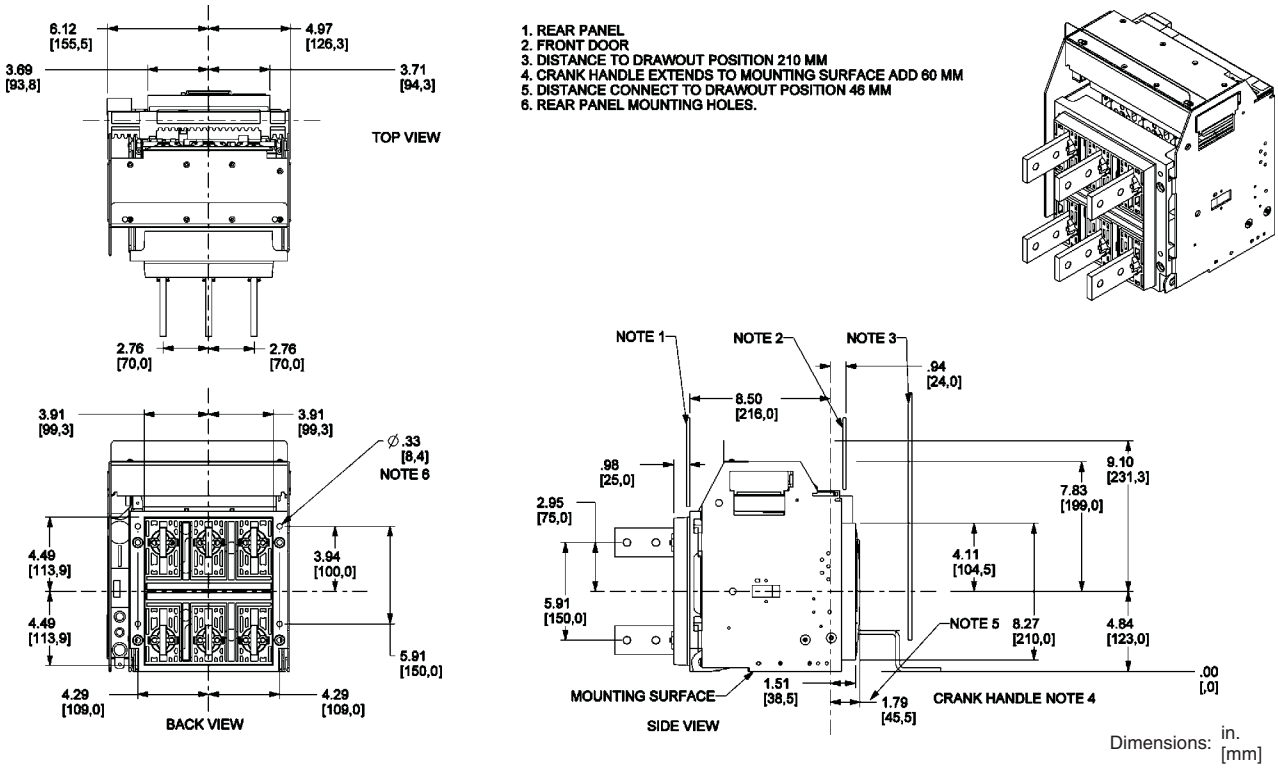

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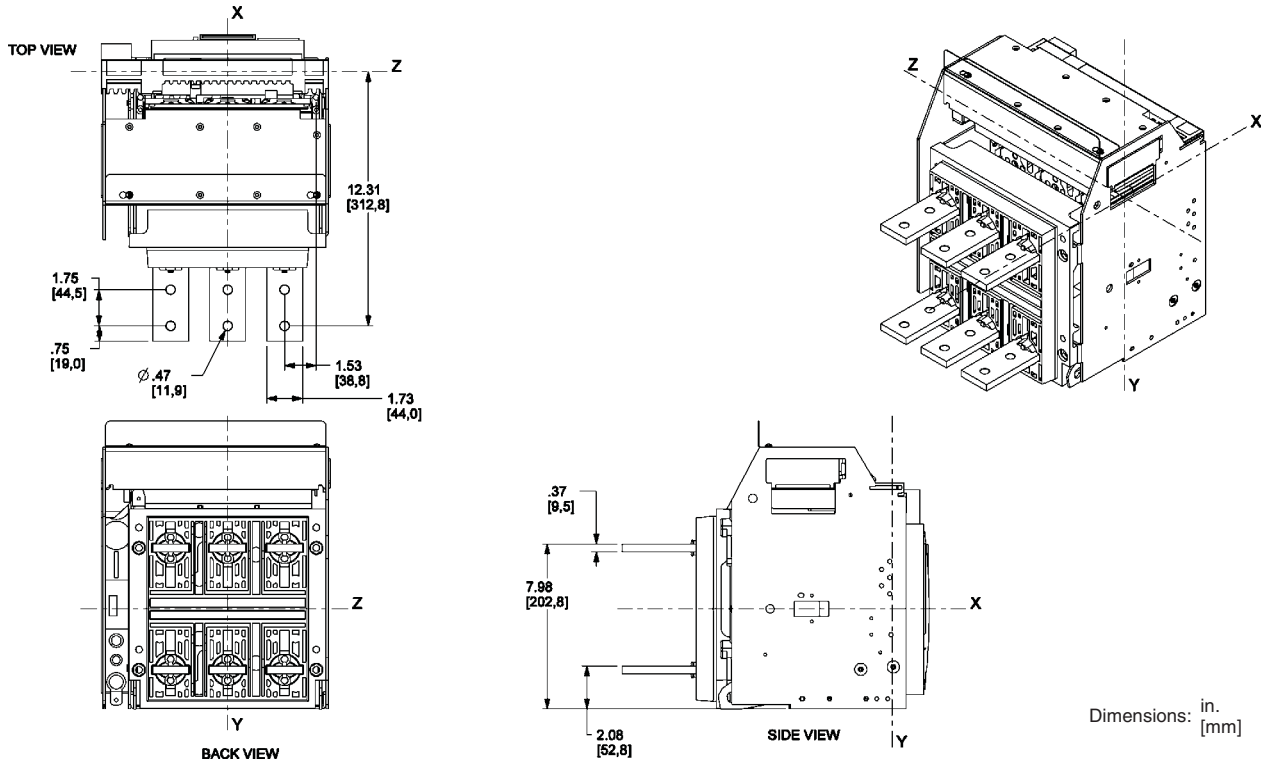
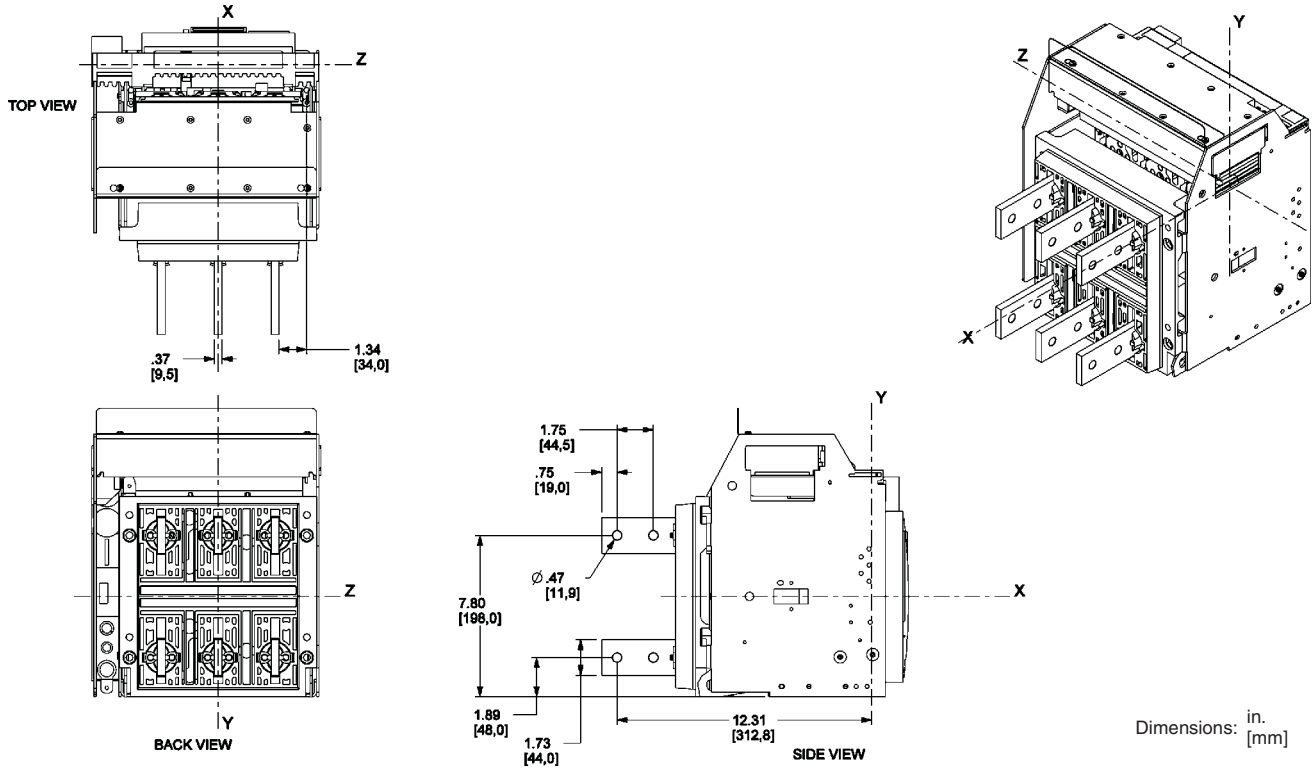
Figure 21: 800–1200 A Masterpact NT UL/ANSI 3P Drawout—RCTH Rear-Connected "T" Horizontal



Dimensions: in. [mm]

Figure 22: 800–1200 A Masterpact NT UL/ANSI 3P Drawout—RCTV Rear-Connected "T" Vertical



Dimensions: in. [mm]

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Figure 23: 800–1200 A Masterpact NT UL/ANSI 3P Drawout—FCF Front-Connected Flat

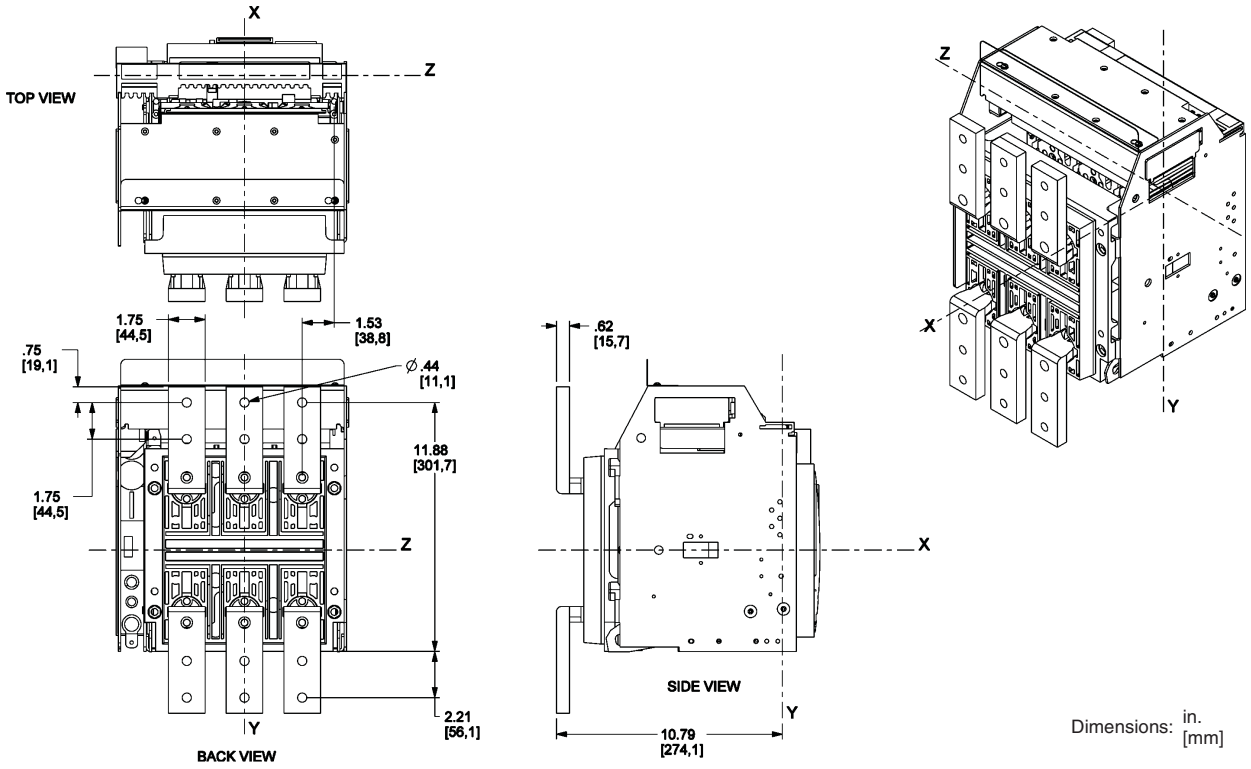

Figure 24: 800–1200 A Masterpact NT UL/ANSI 3P Drawout—Door Cutout Dimensions

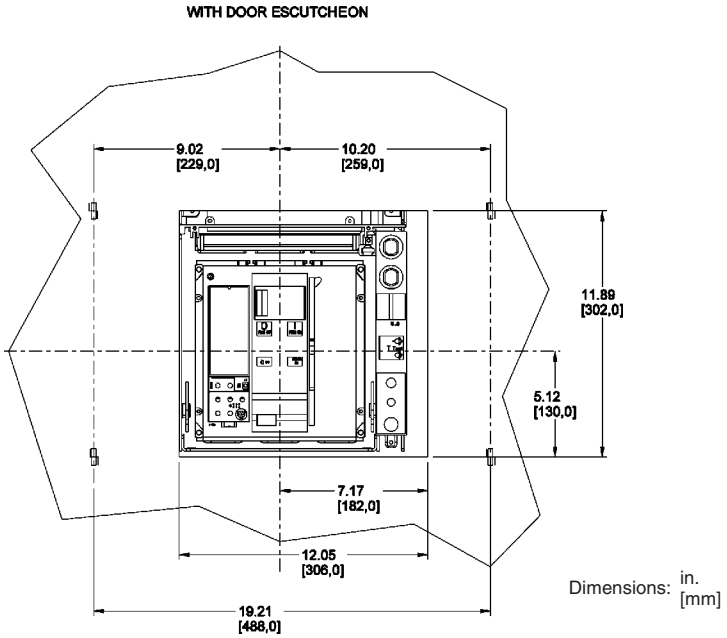

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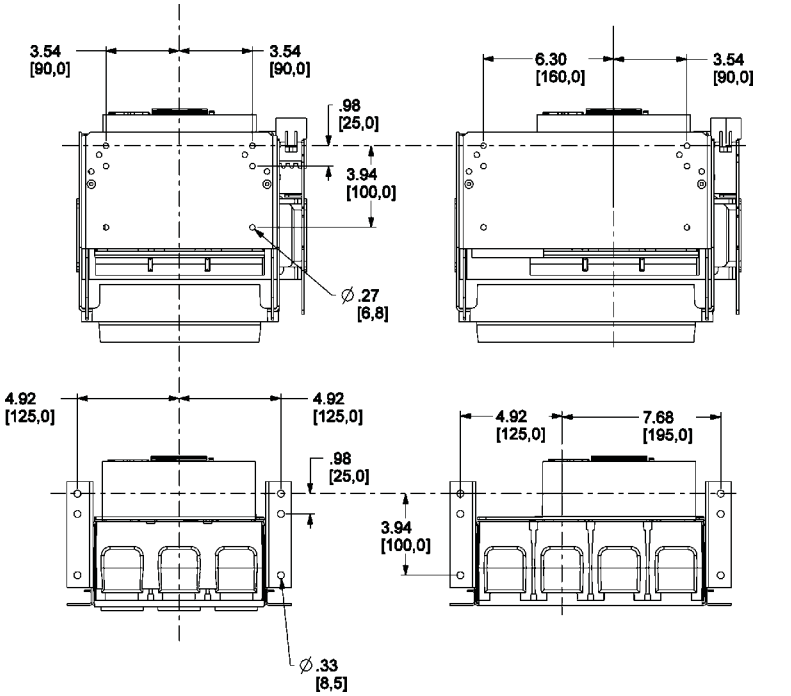
Figure 25: 800–1200 A Masterpact NT UL/ANSI Drawout and Fixed—Pan Dimensions



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UL/ANSI 3P Fixed Circuit Breakers

Figure 26: 800–1200 A and 1600 A Masterpact NT UL/ANSI 3P Fixed—Master Drawing

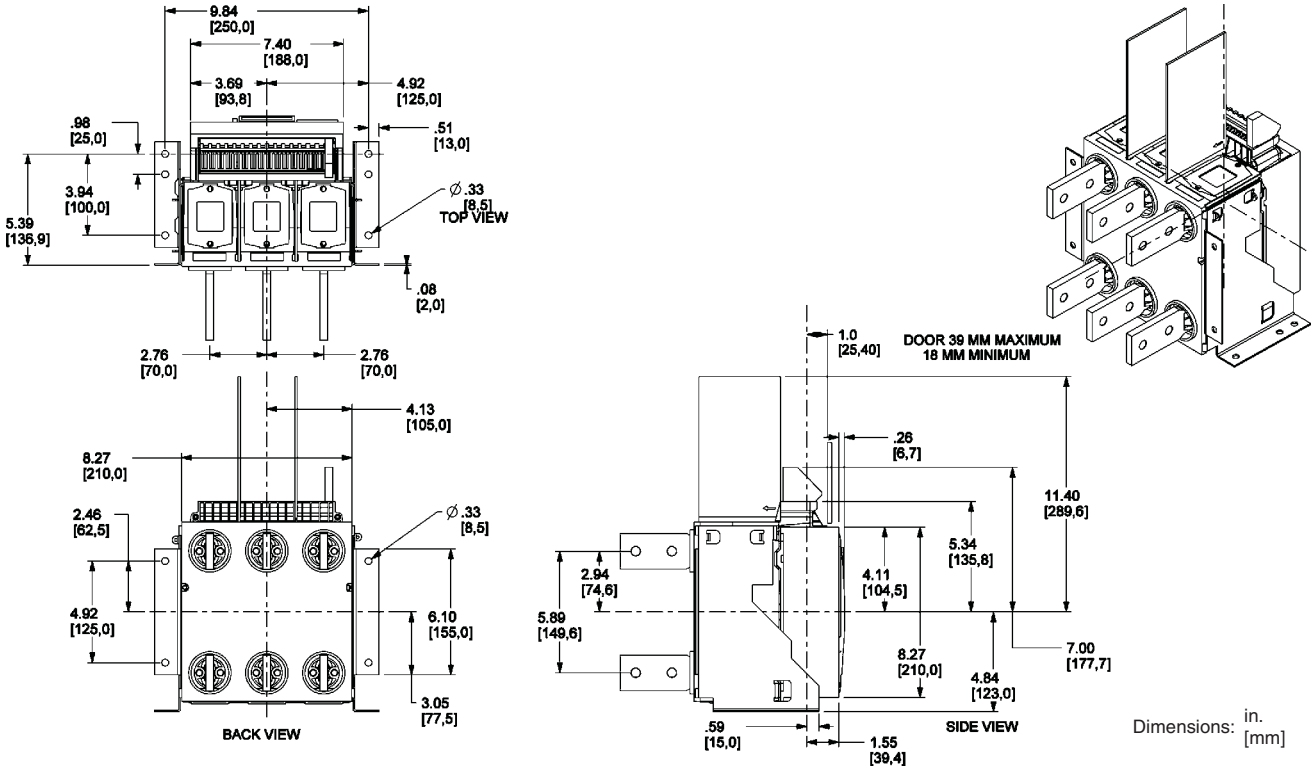

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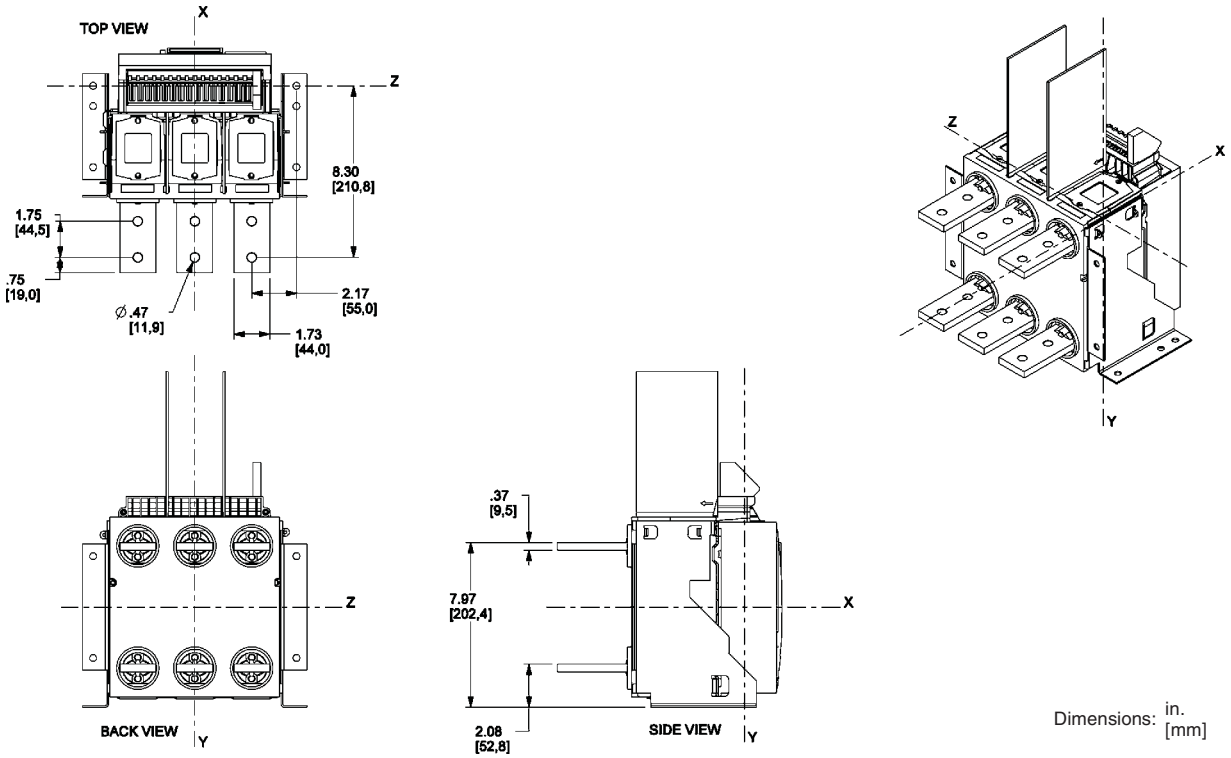
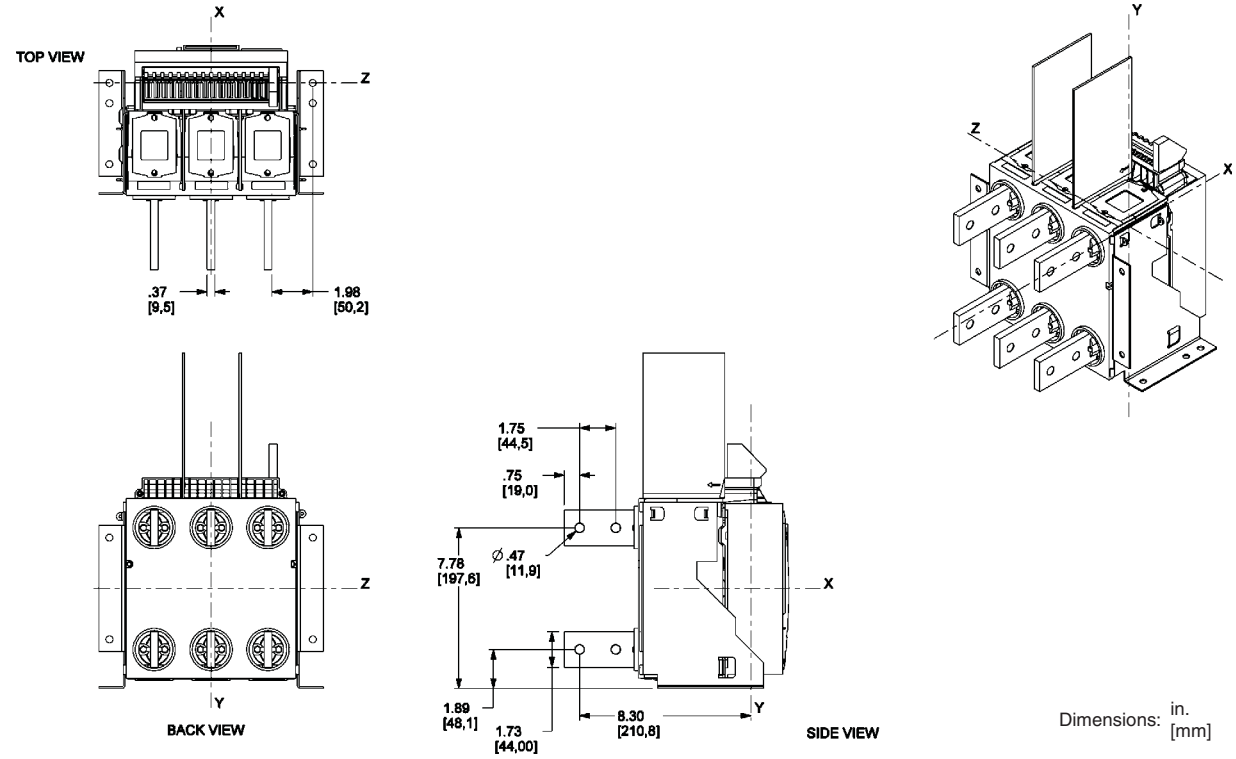
Figure 27: 800–1200 A Masterpact NT UL/ANSI 3P Fixed—RCTH Rear-Connected "T" Horizontal



Dimensions: in. [mm]

Figure 28: 800–1200 A Masterpact NT UL/ANSI 3P Fixed—RCTV Rear-Connected "T" Vertical



Dimensions: in. [mm]

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Figure 29: 800–1200 A Masterpact NT UL/ANSI 3P Fixed—FCF Front-Connected Flat

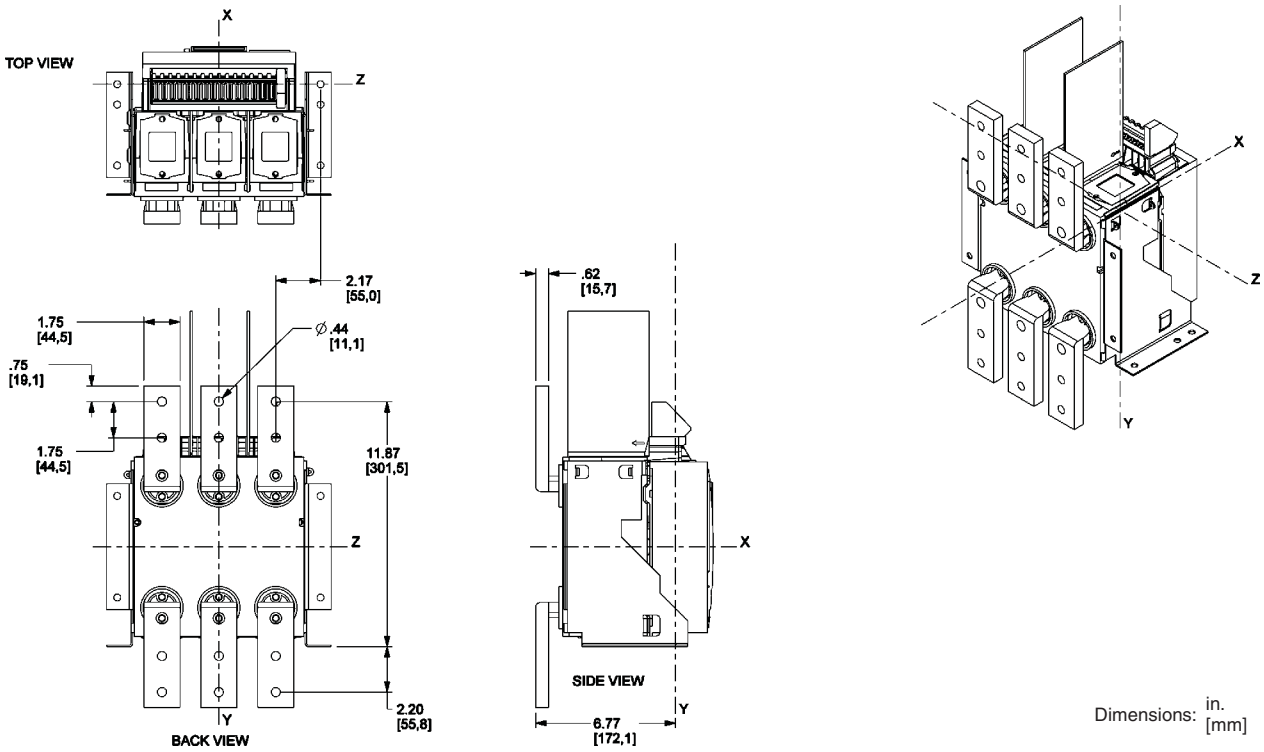

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Figure 30: 1600 A Masterpact NT UL 3P Fixed—RCV Rear-Connected Vertical

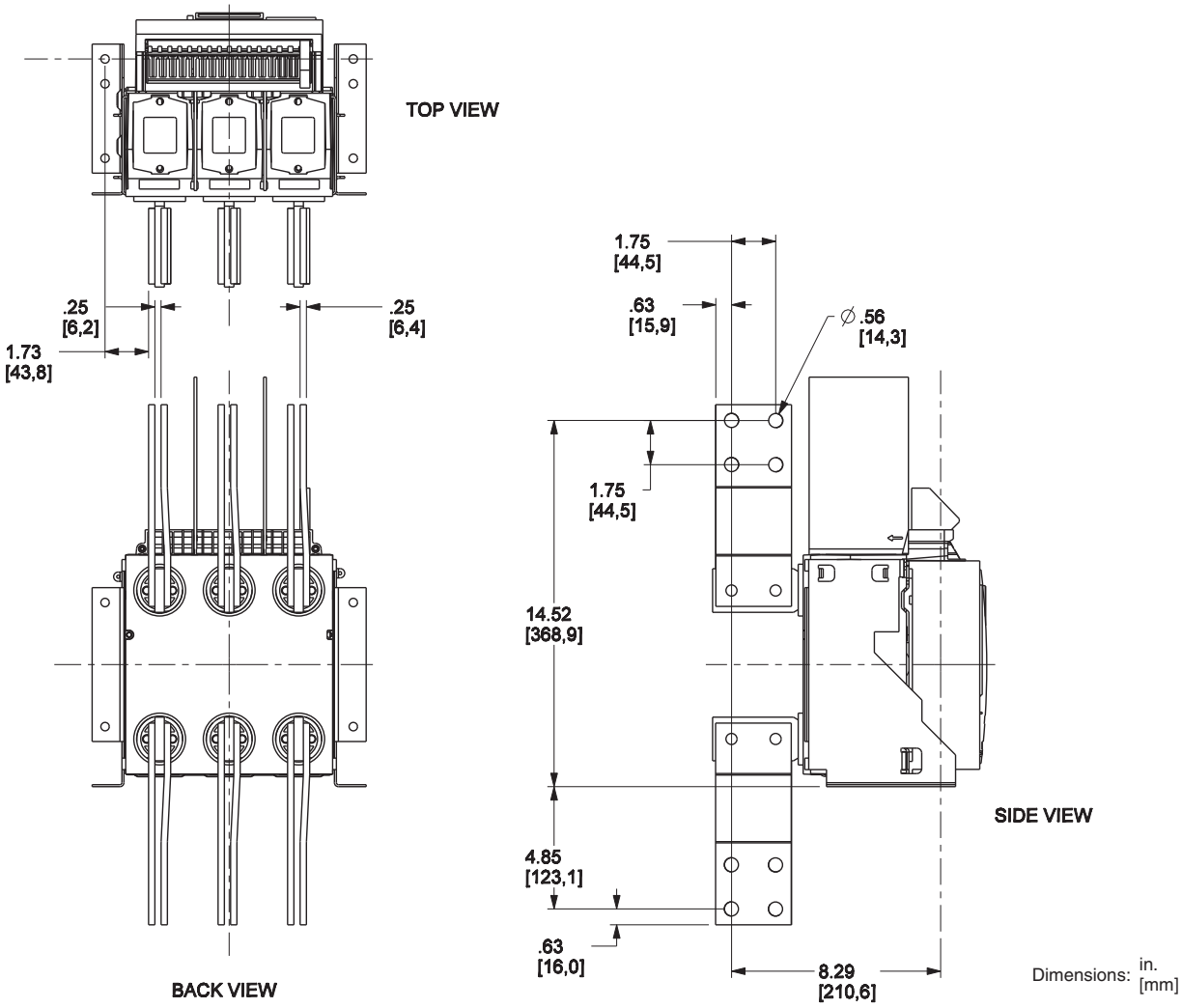

Figure 31: 800–1200 A Masterpact NT UL/ANSI 3P Fixed—Door Cutout Dimensions

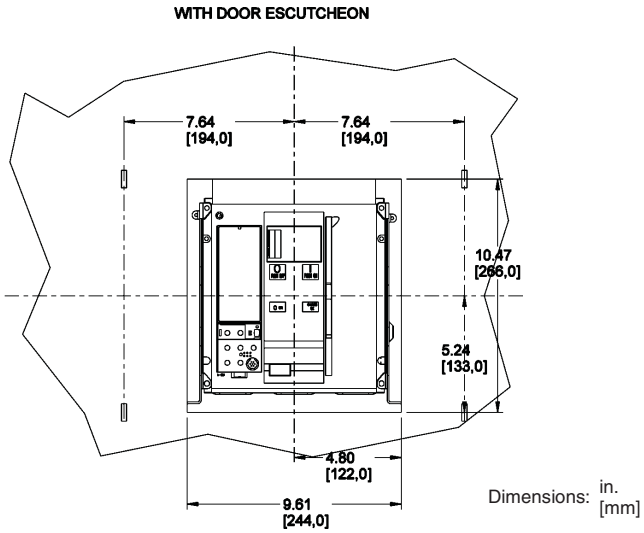

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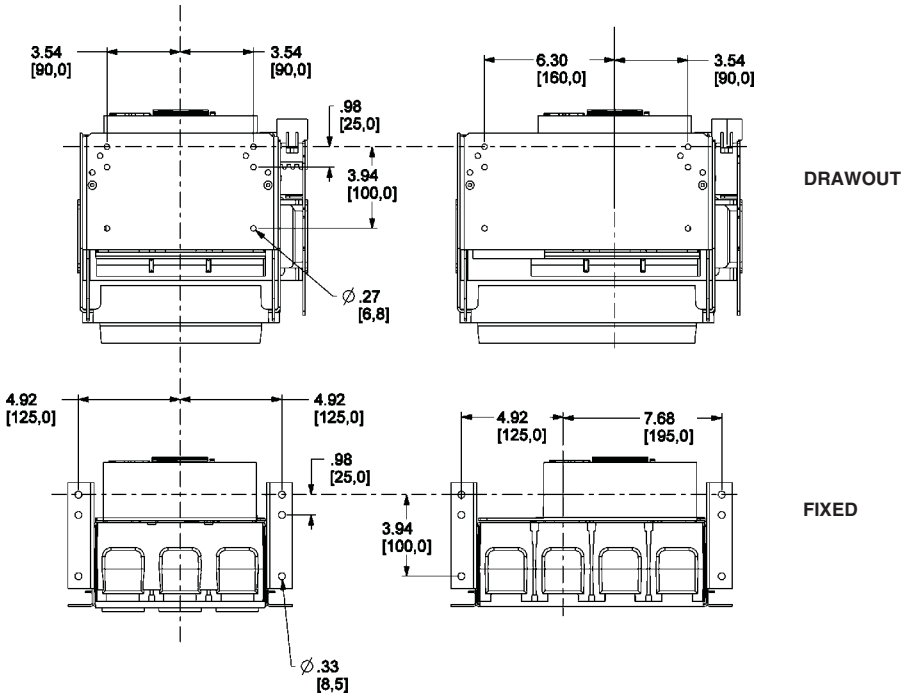
Figure 32: 800–1200 A Masterpact NT UL/ANSI Fixed and Drawout—Pan Dimensions



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UL/ANSI 4P Drawout Circuit Breakers

Figure 33: 800–1200 A and 1600 A Masterpact NT UL/ANSI 4P Drawout—Master Drawing

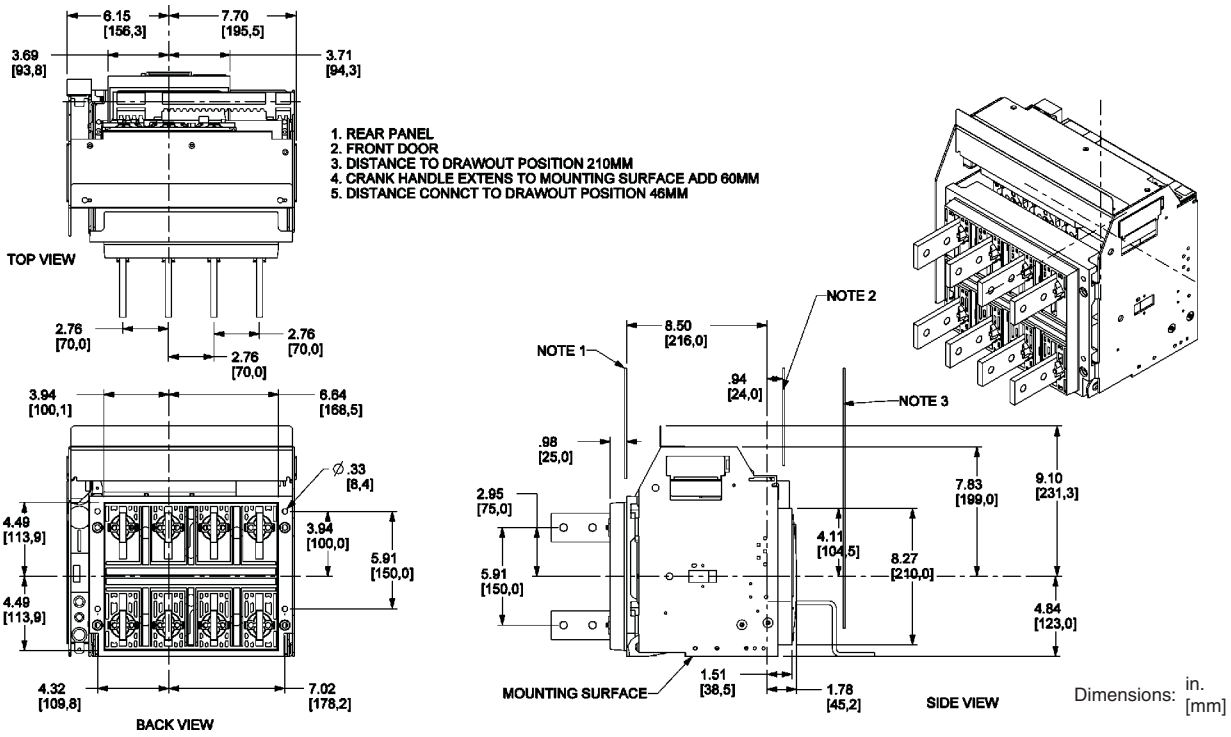

Figure 34: 800–1200 A Masterpact NT UL/ANSI 4P Drawout—RCTH Rear-Connected "T" Horizontal

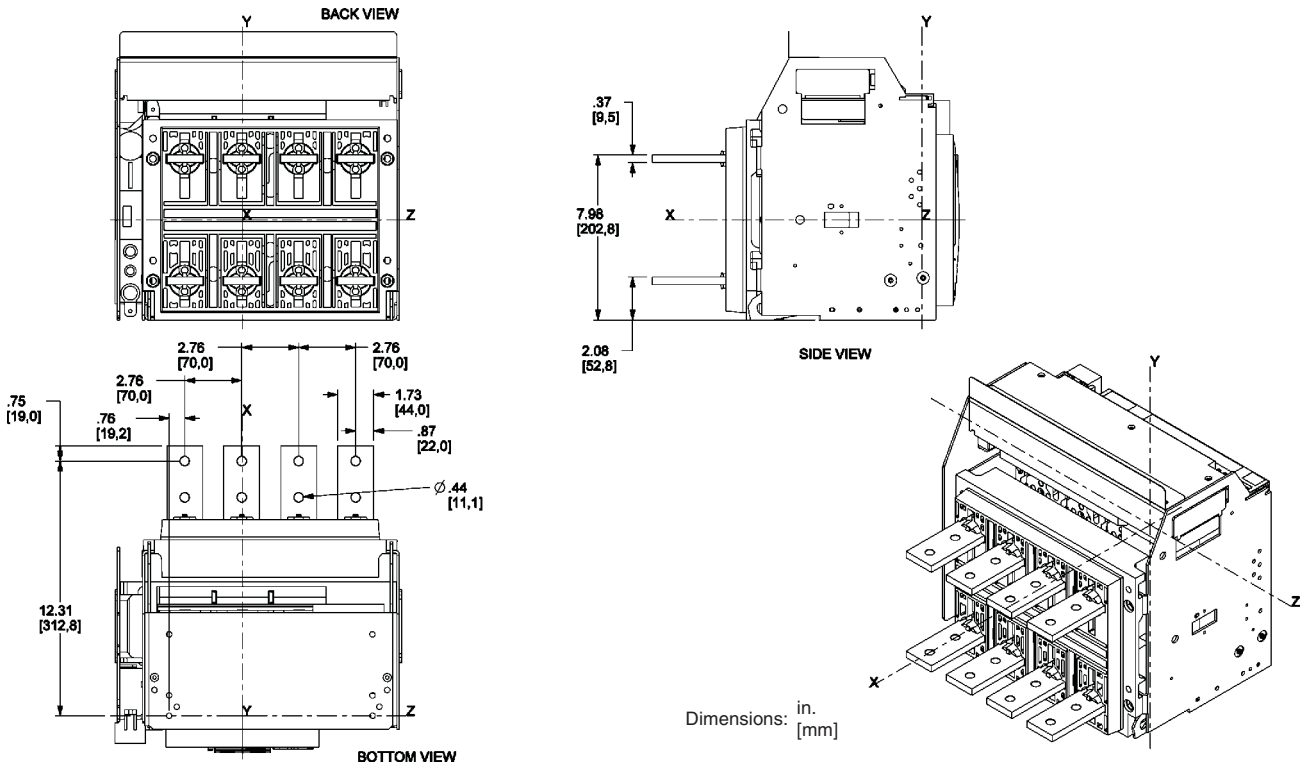

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Figure 35: 800–1200 A Masterpact NT UL/ANSI 4P Drawout—RCTV Rear-Connected "T" Vertical

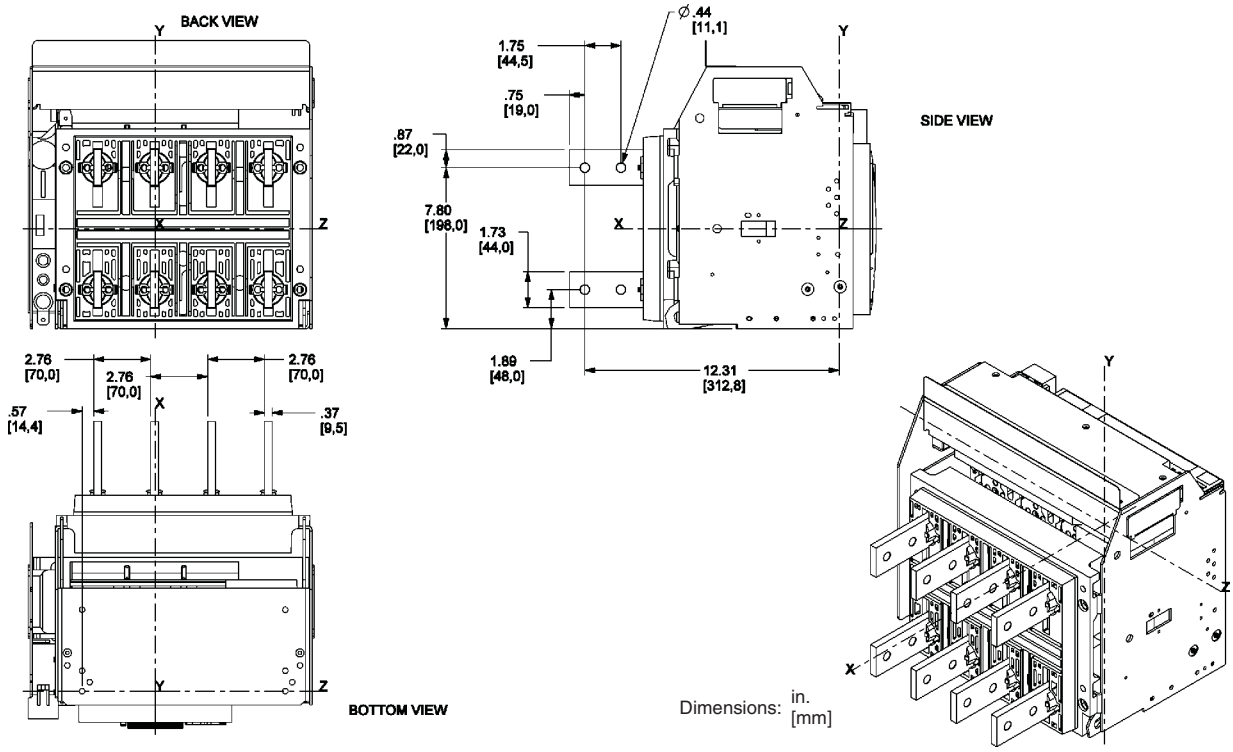

Figure 36: 800–1200 A Masterpact NT UL/ANSI 4P Drawout—FCF Front-Connected Flat

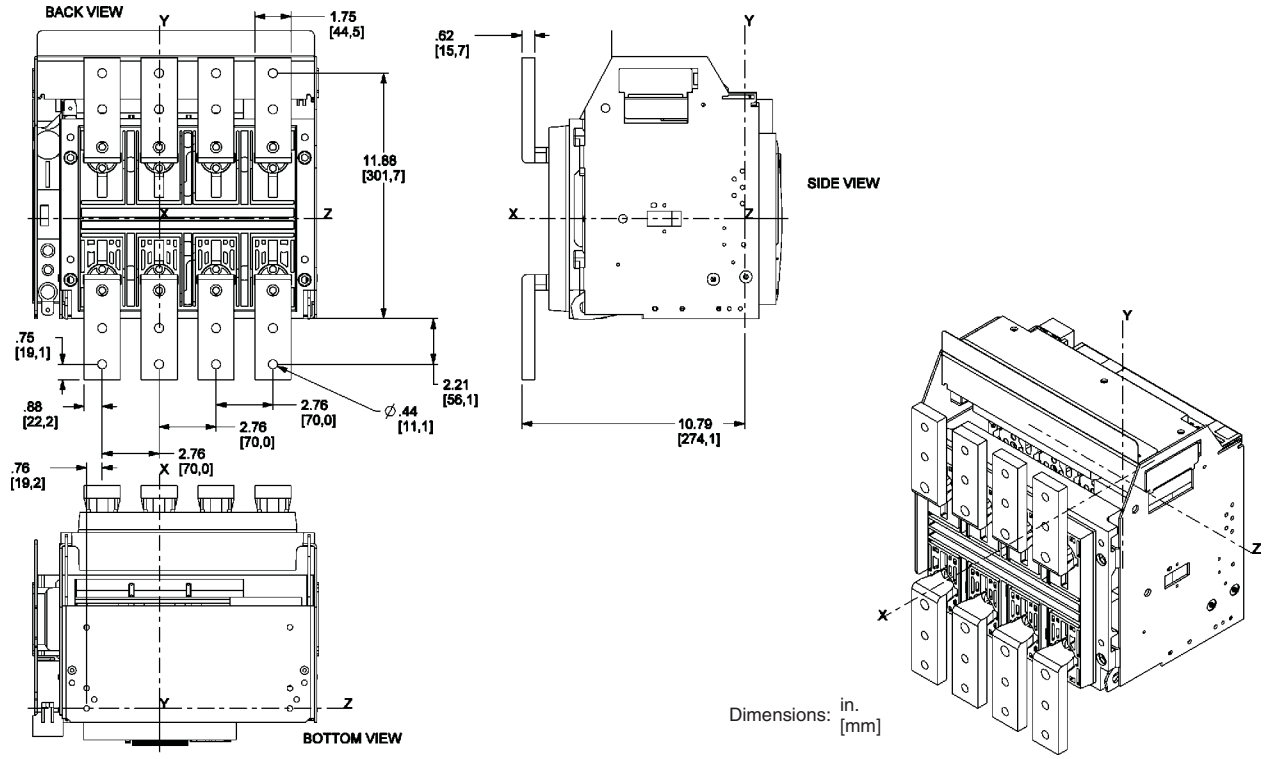

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Figure 37: 800–1200 A Masterpact NT UL/ANSI 4P Drawout—Door Cutout Dimensions

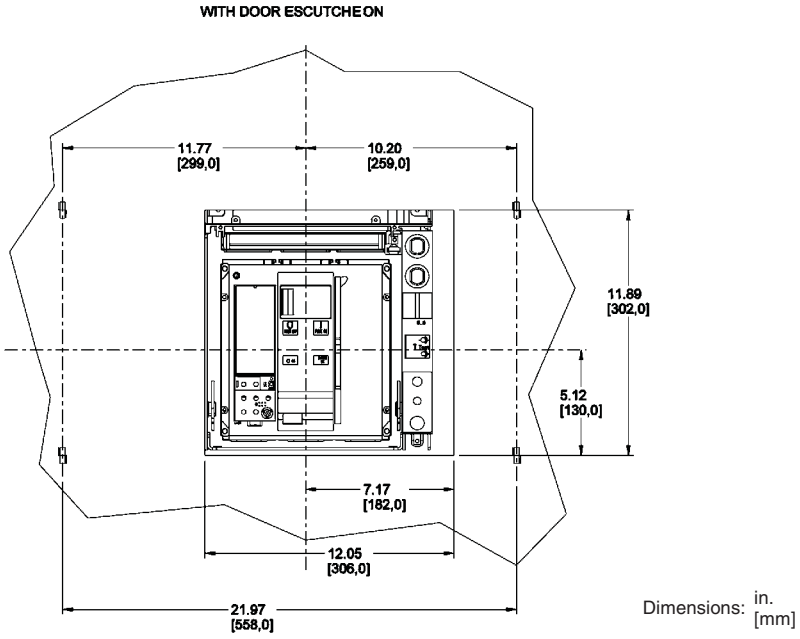
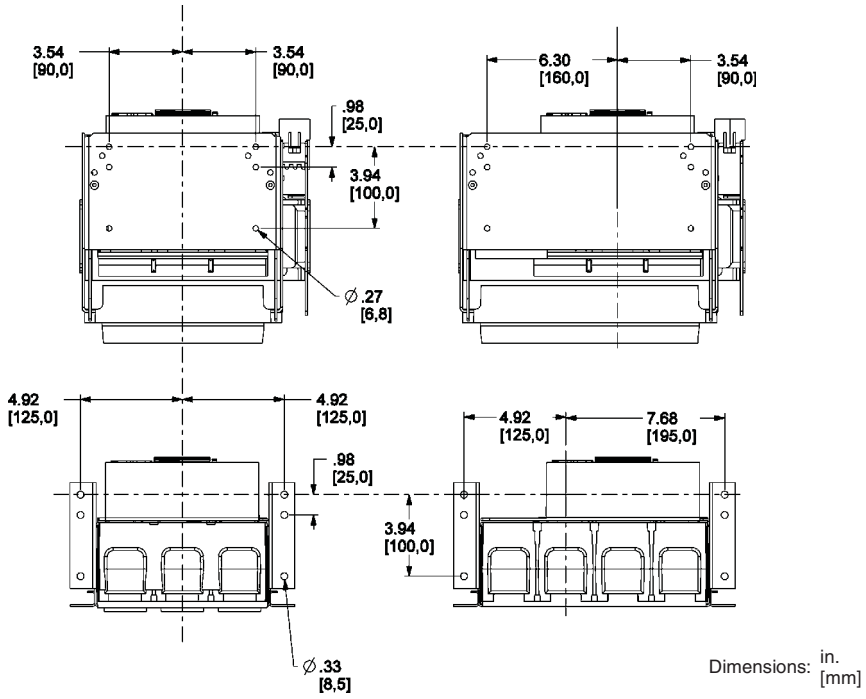


Figure 38: 800–1200 A Masterpact NT UL/ANSI Drawout—Pan Dimensions



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UL/ANSI 4P Fixed Circuit Breakers

Figure 39: 800–1200 A Masterpact NT UL/ANSI 4P Fixed—Master Drawing

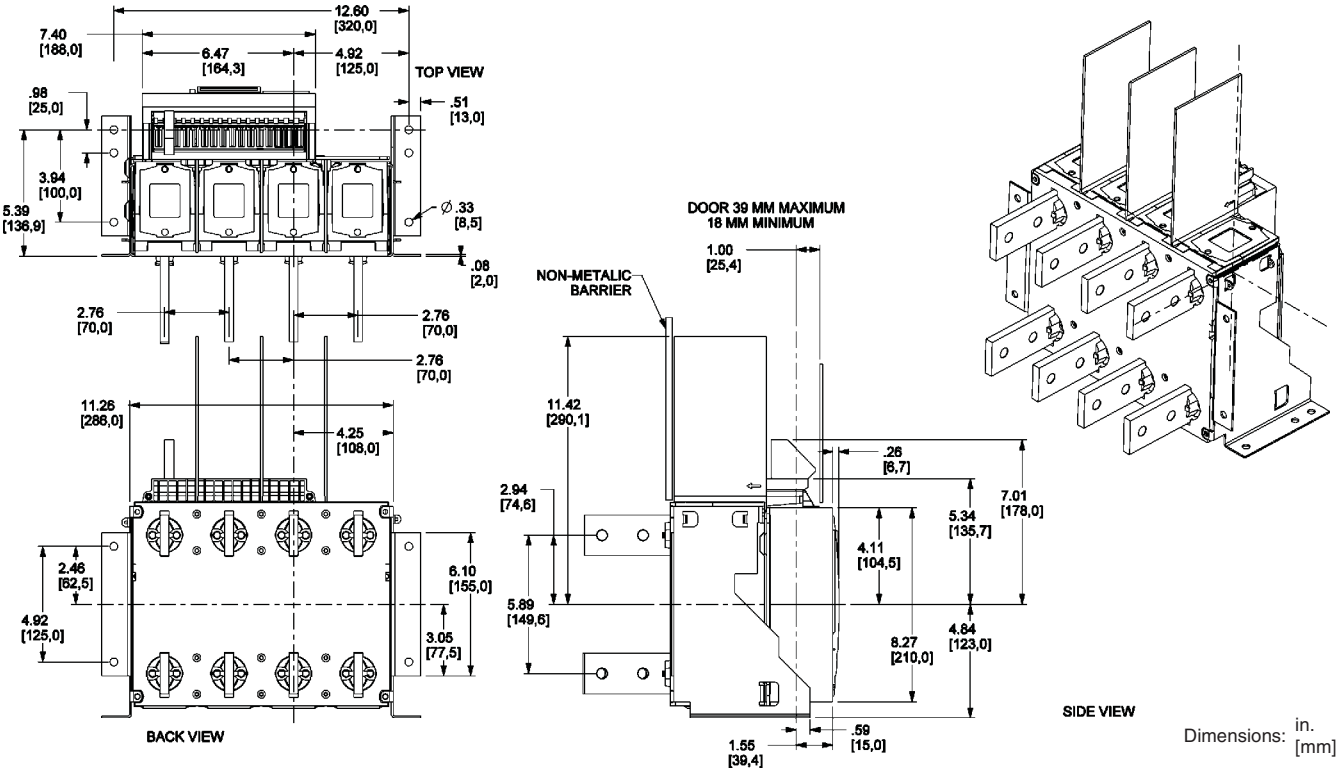

Figure 40: 800–1200 A Masterpact NT UL/ANSI 4P Fixed—RCTH Rear-Connected "T" Horizontal

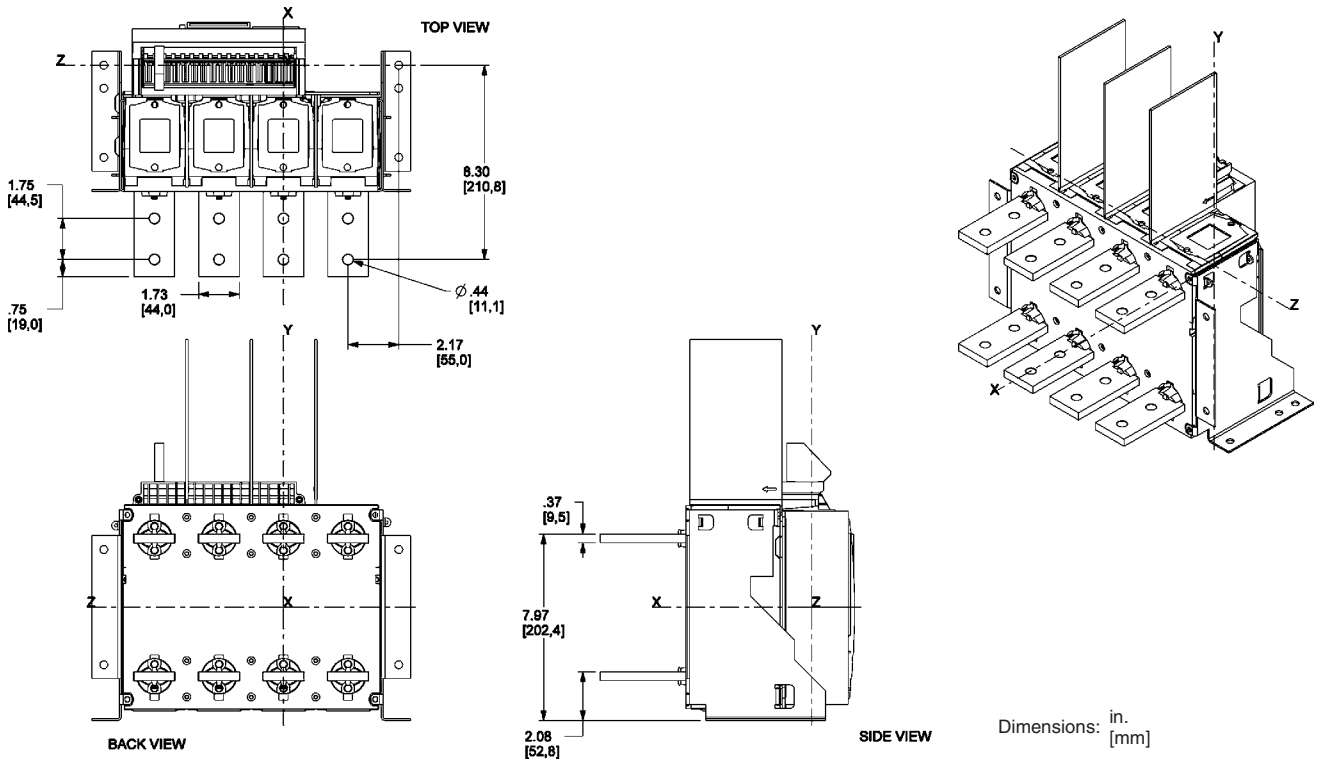

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Figure 41: 800–1200 A Masterpact NT UL/ANSI 4P Fixed—RCTV Rear-Connected "T" Vertical

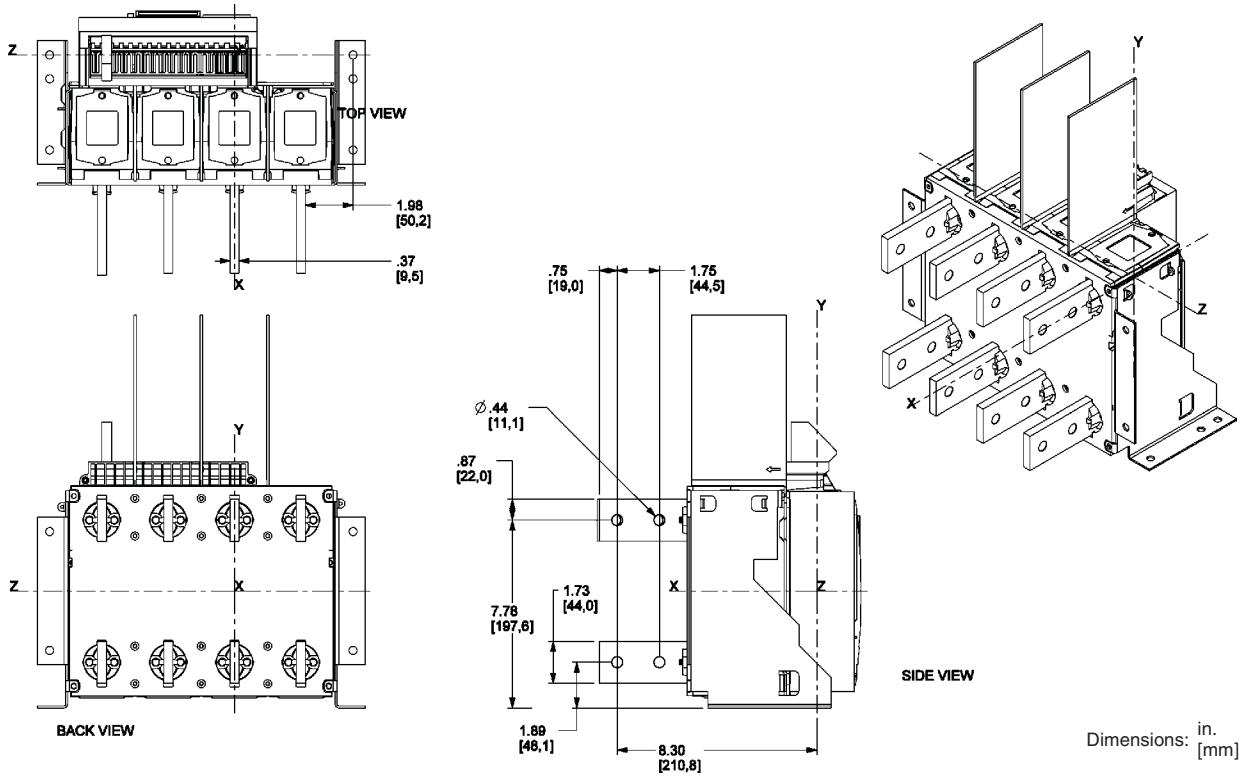

Figure 42: 800–1200 A Masterpact NT UL/ANSI 4P Fixed—FCF Front-Connected Flat

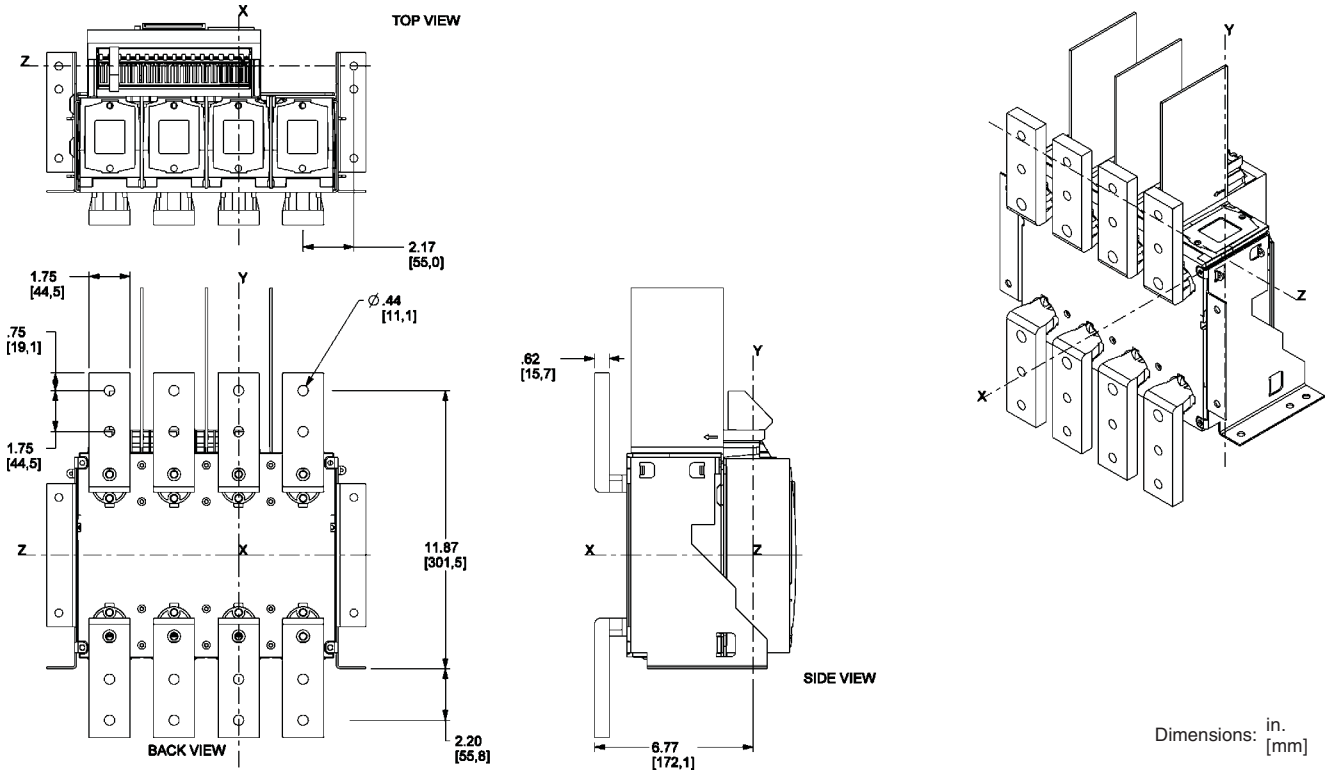

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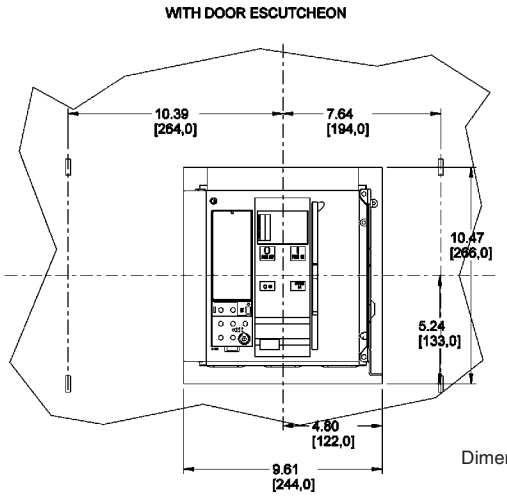
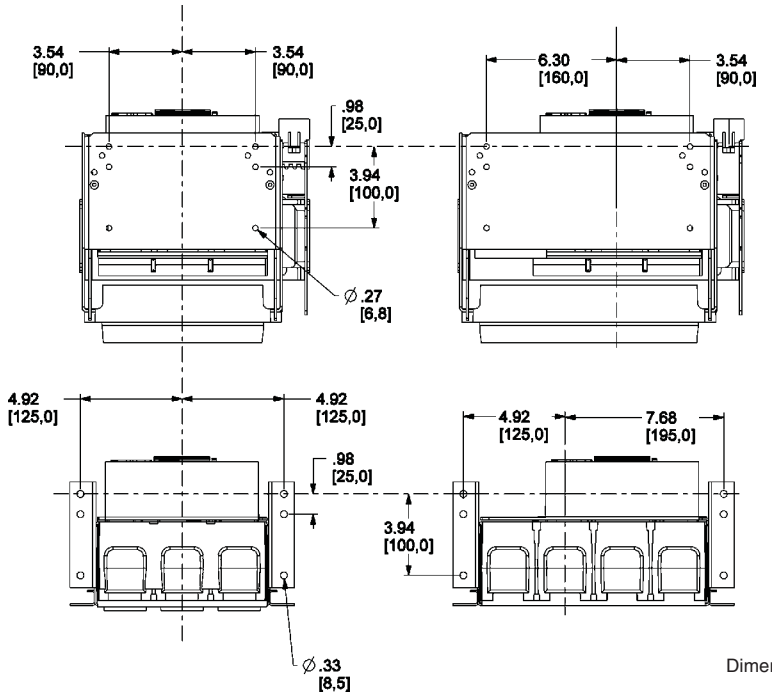
Figure 43: 800–1200 A Masterpact NT UL/ANSI 4P Fixed—Door Cutout Dimensions



Dimensions: in. [mm]

Figure 44: 800–1200 A Masterpact NT UL/ANSI Fixed—Pan Dimensions



Dimensions: in. [mm]

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IEC 3P Drawout Circuit Breakers

Figure 45: 800–1600 A Masterpact NT 3P Drawout—Master Drawing

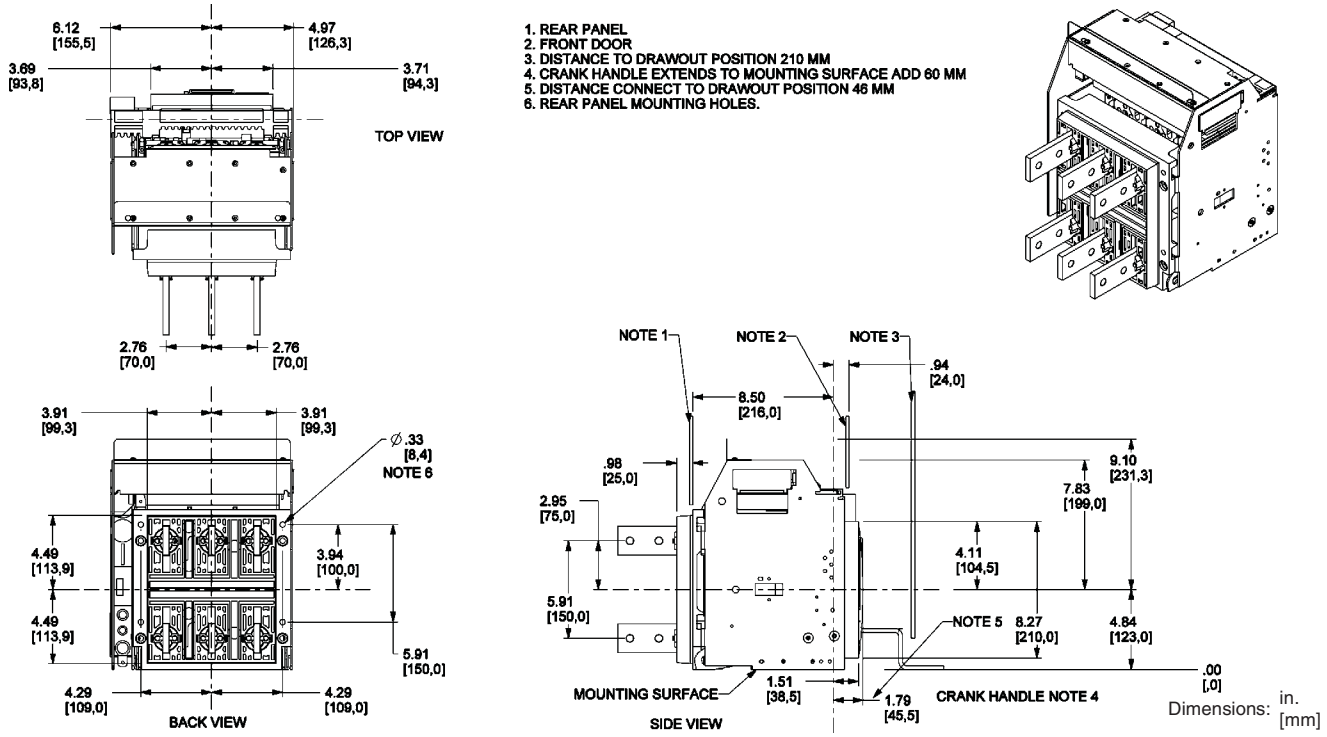

Figure 46: 800–1600 A Masterpact NT IEC 3P Drawout—RCTV Rear-Connected "T" Vertical

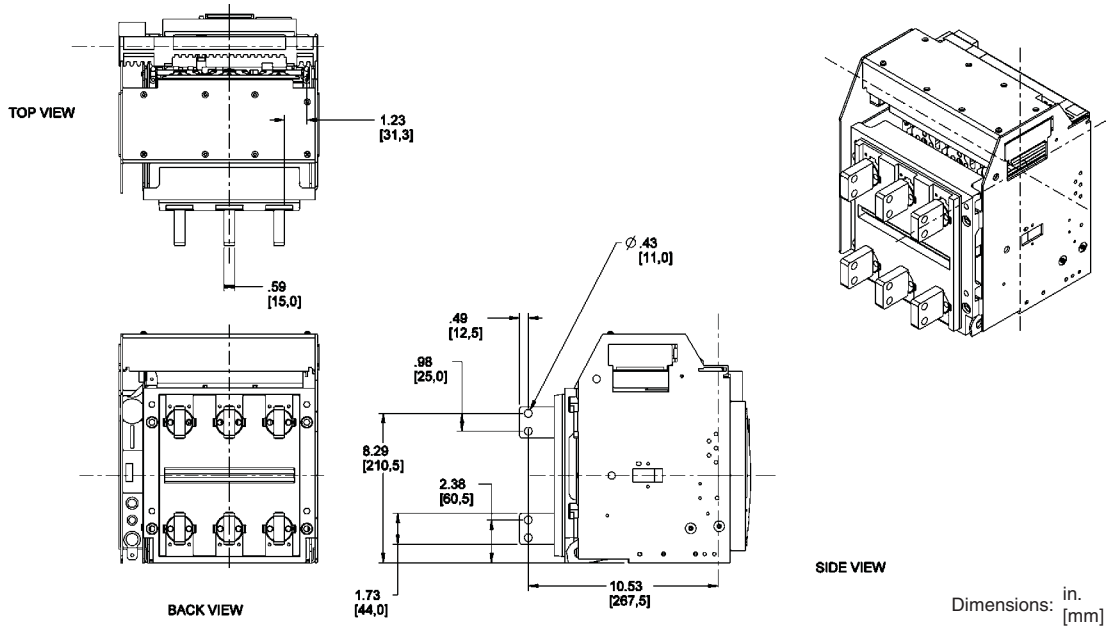

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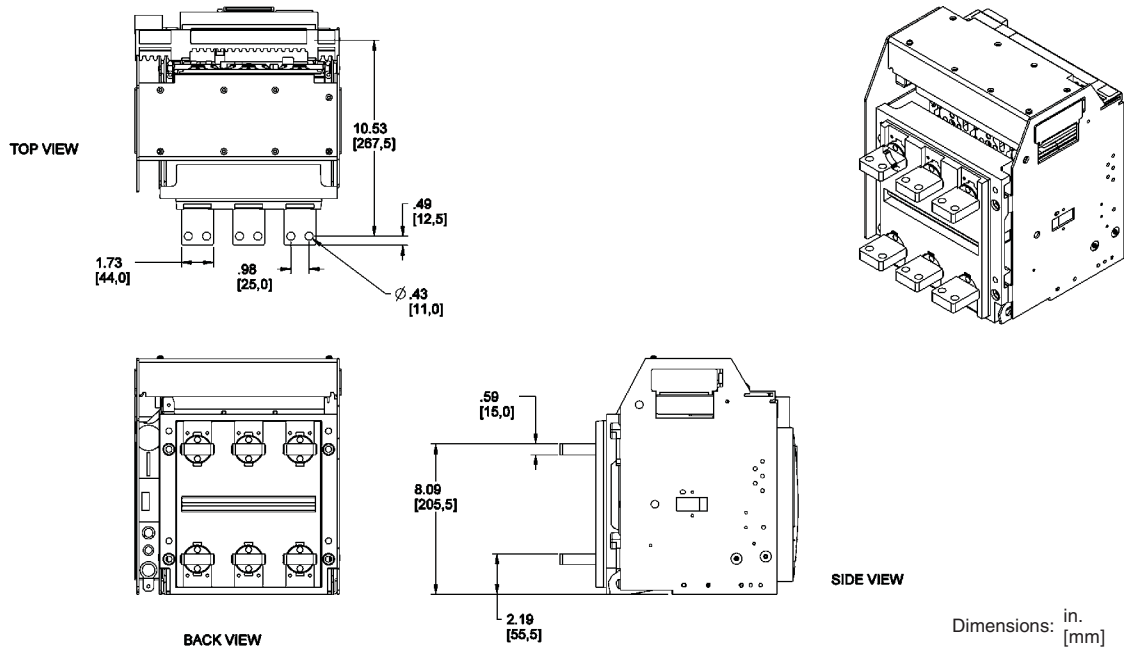
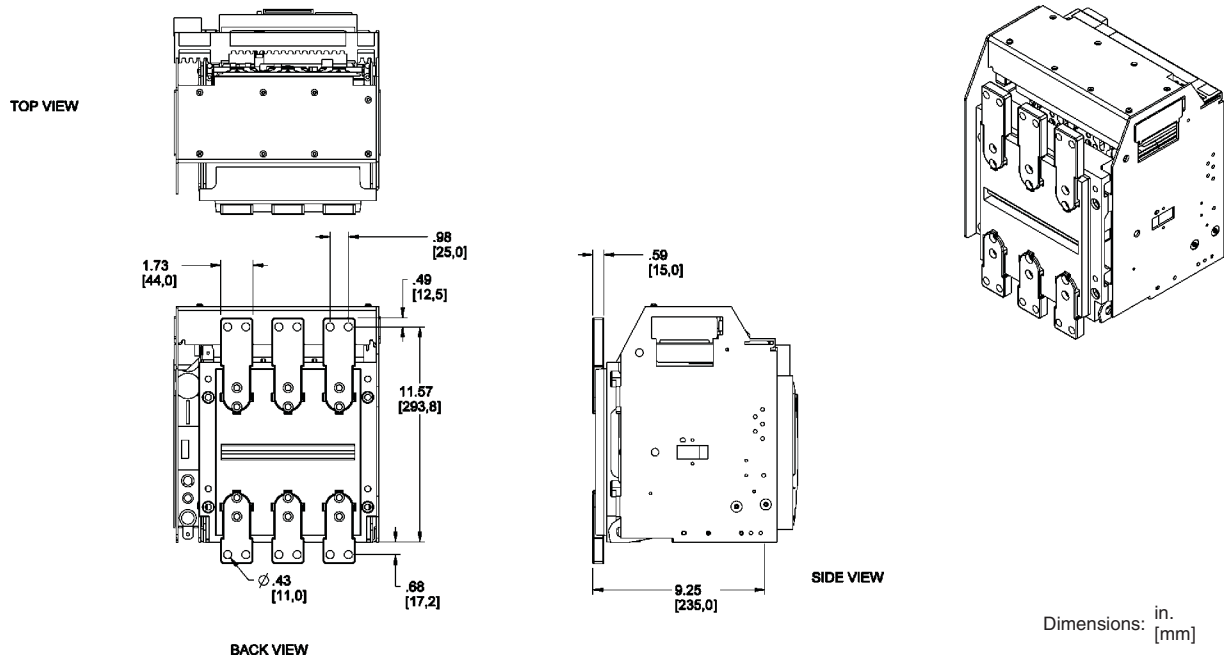
Figure 47: 800–1600 A Masterpact NT IEC 3P Drawout—RCTH Rear-Connected "T" Horizontal



Dimensions: in. [mm]

Figure 48: 800–1600 A Masterpact NT IEC 3P Drawout—FCF Front-Connected Flat



Dimensions: in. [mm]

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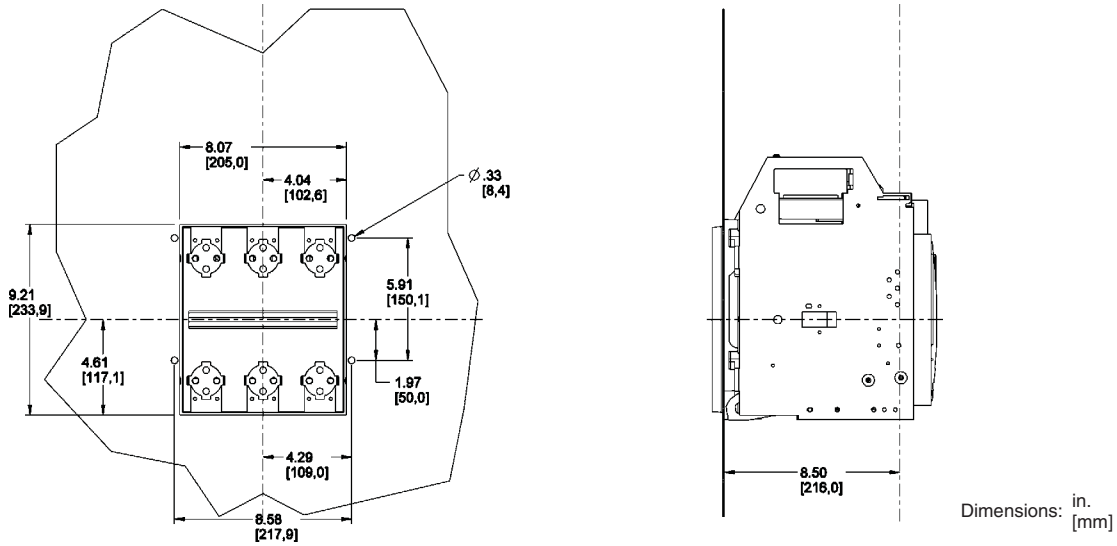
Figure 49: 800–1200 A Masterpact NT IEC 3P Drawout—Rear Cutout Dimensions



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IEC 3P Fixed Circuit Breakers

Figure 50: 800–1600 A Masterpact NT 3P Fixed—Master Drawing

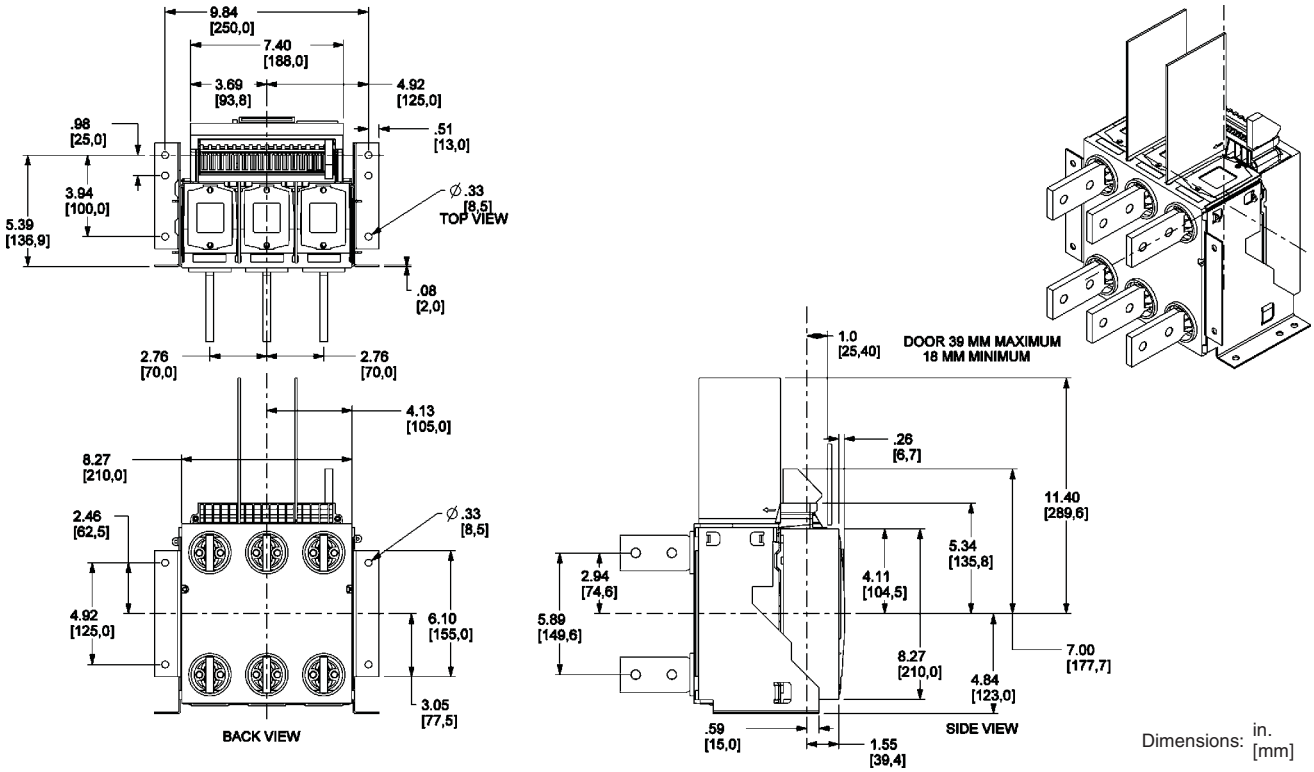

Figure 51: 800–1600 A Masterpact NT IEC 3P Fixed—RCTV Rear-Connected "T" Vertical

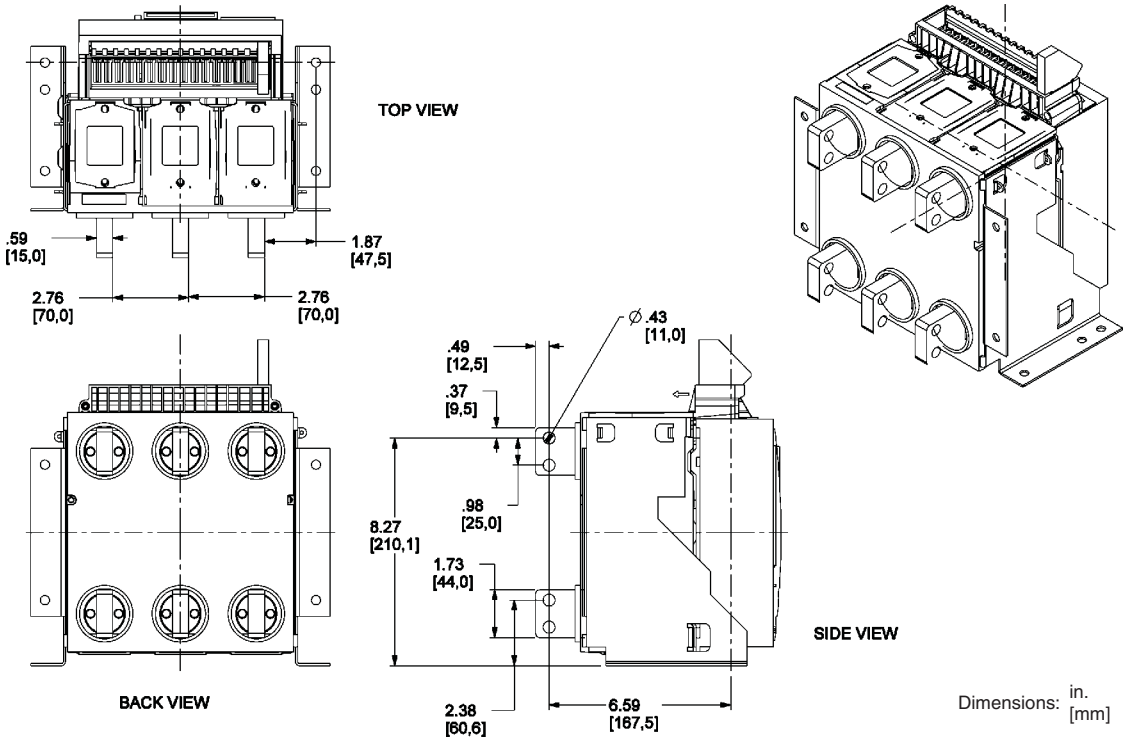

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Figure 52: 800–1600 A Masterpact NT IEC 3P Fixed—RCTH Rear-Connected "T" Horizontal

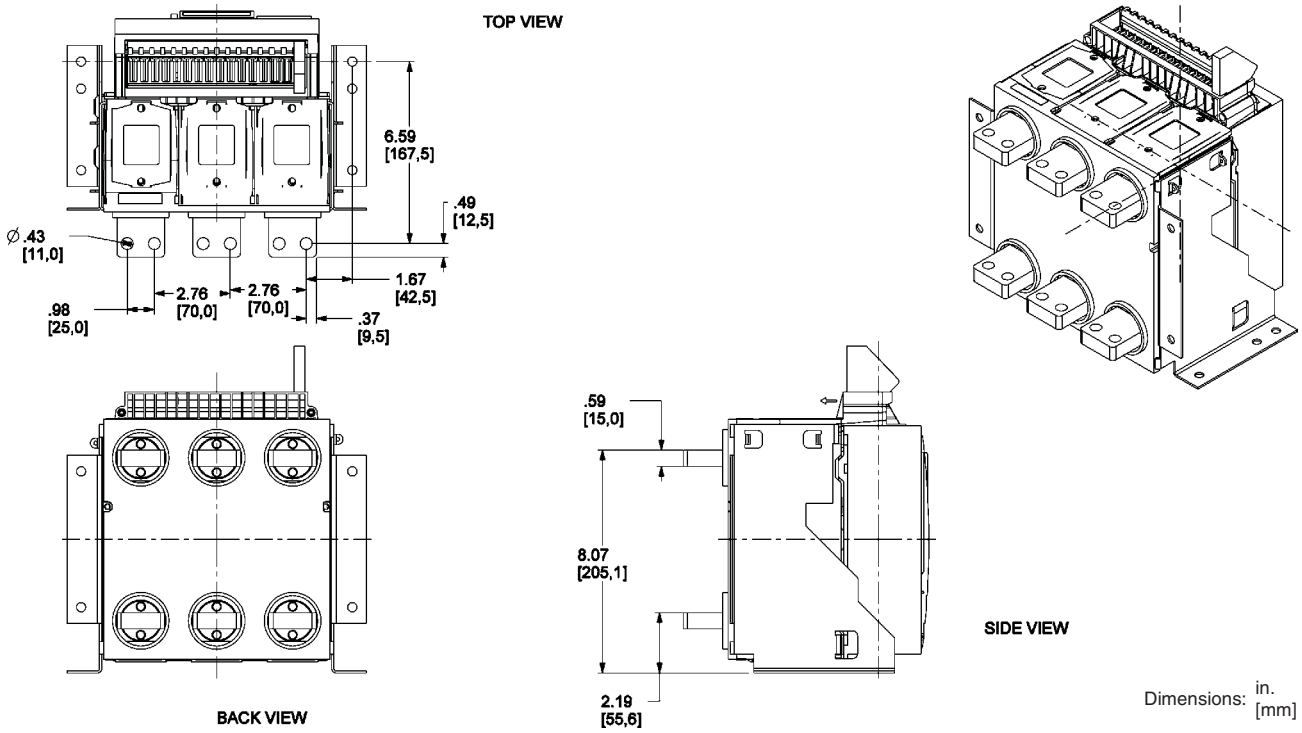

Figure 53: 800–1600 A Masterpact NT IEC 3P Fixed—FCF Front-Connected Flat

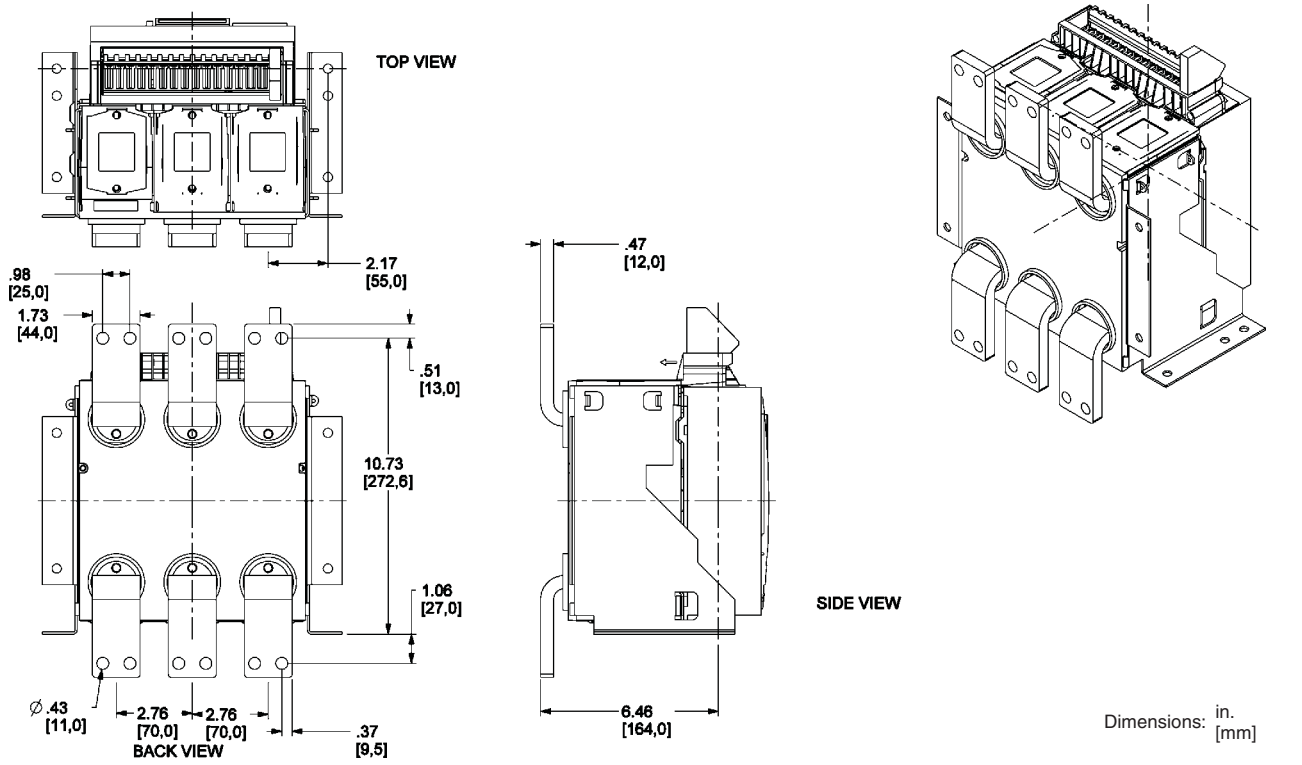

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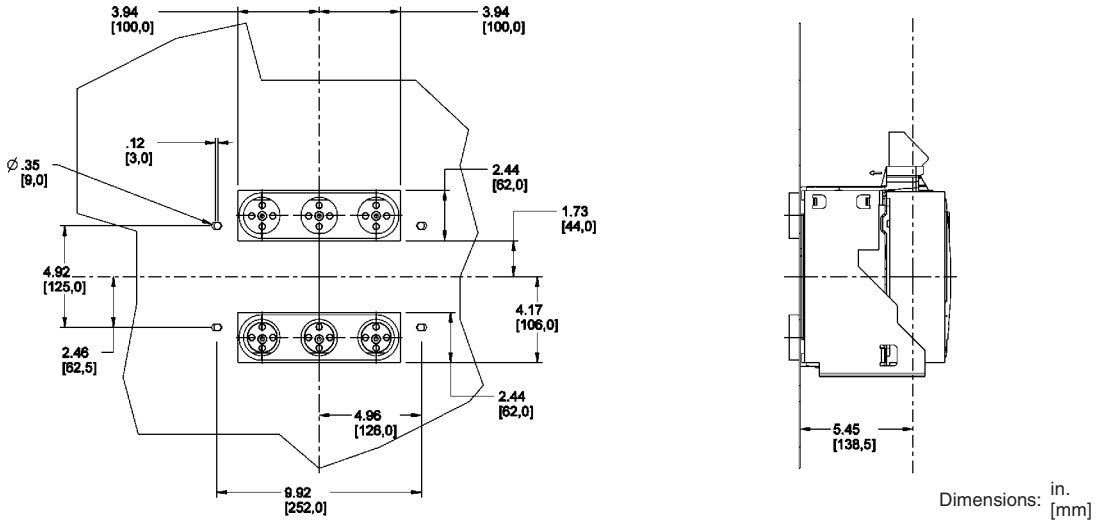
Figure 54: 800–1200 A Masterpact NT IEC 3P Fixed—Rear Cutout Dimensions



Dimensions: in. [mm]

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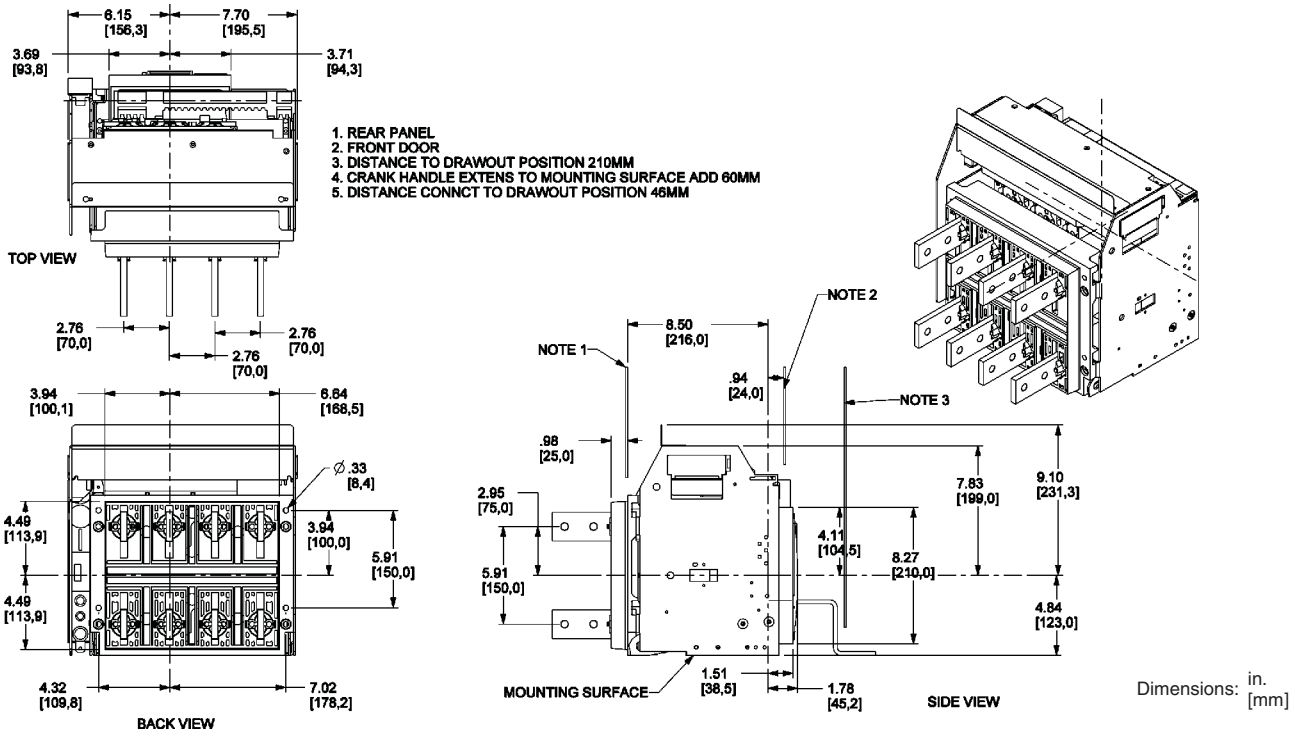
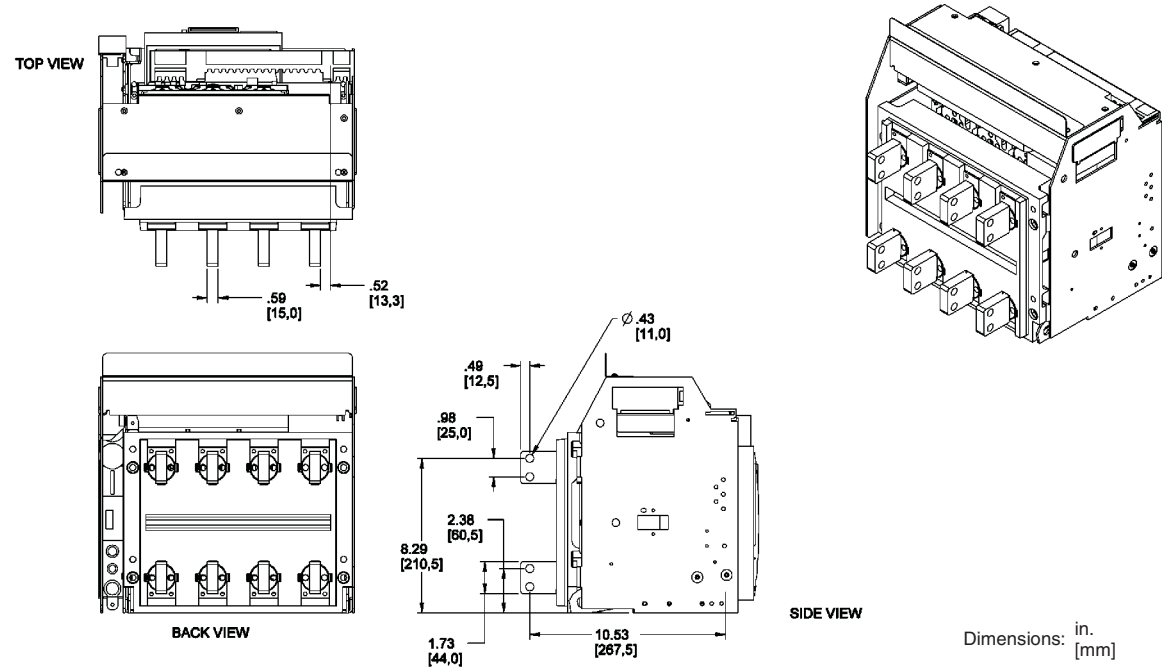
IEC 4P Drawout Circuit Breakers

Figure 55: 800–1600 A Masterpact NT 4P Drawout—Master Drawing



Dimensions: in. [mm]

Figure 56: 800–1600 A Masterpact NT IEC 4P Drawout—RCTV Rear-Connected "T" Vertical



Dimensions: in. [mm]

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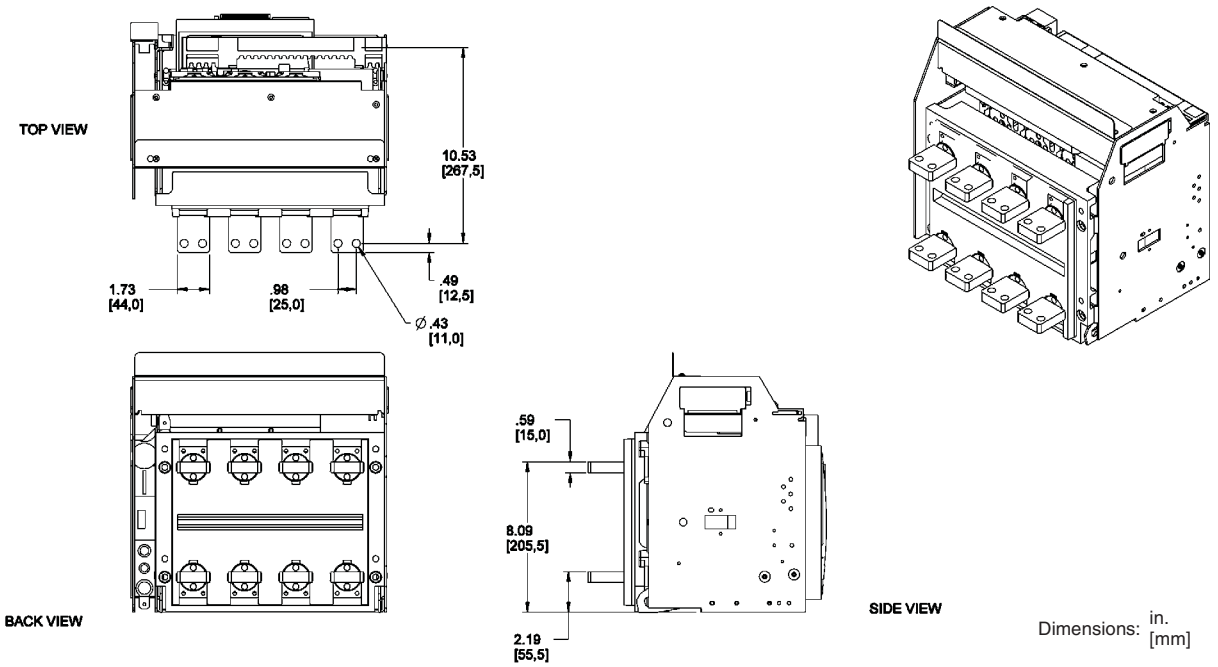
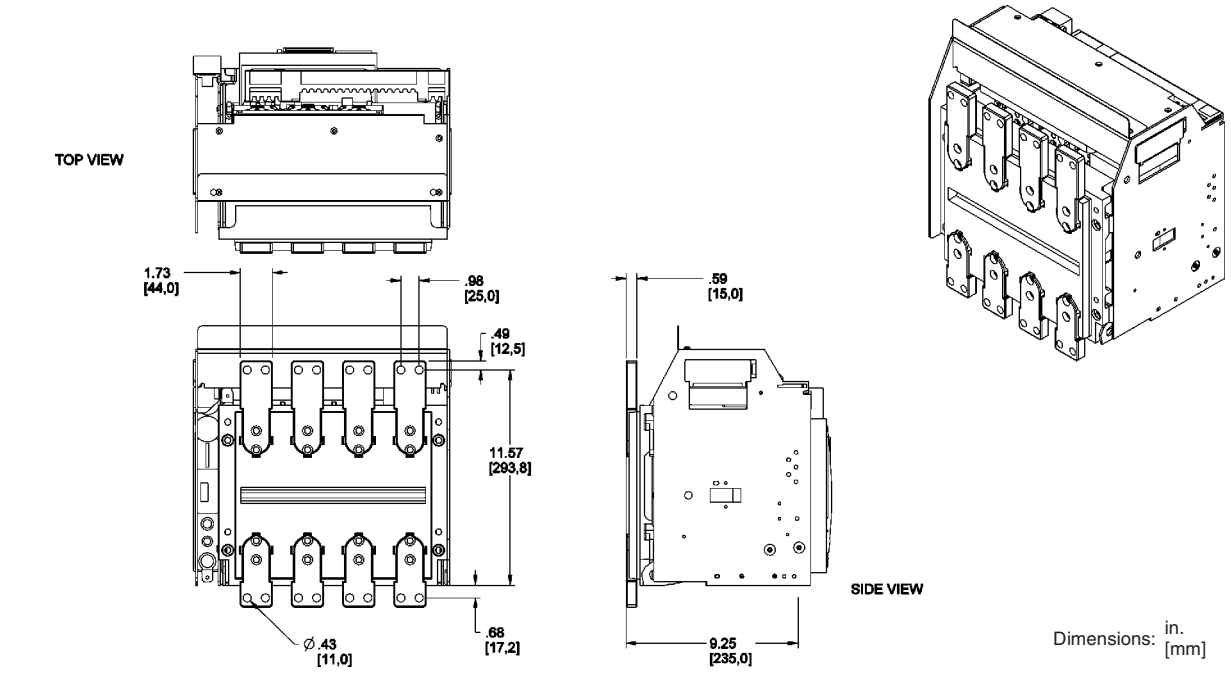
Figure 57: 800–1600 A Masterpact NT IEC 4P Drawout—RCTH Rear-Connected "T" Horizontal



Dimensions: in. [mm]

Figure 58: 800–1600 A Masterpact NT IEC 4P Drawout—FCF Front-Connected Flat



Dimensions: in. [mm]

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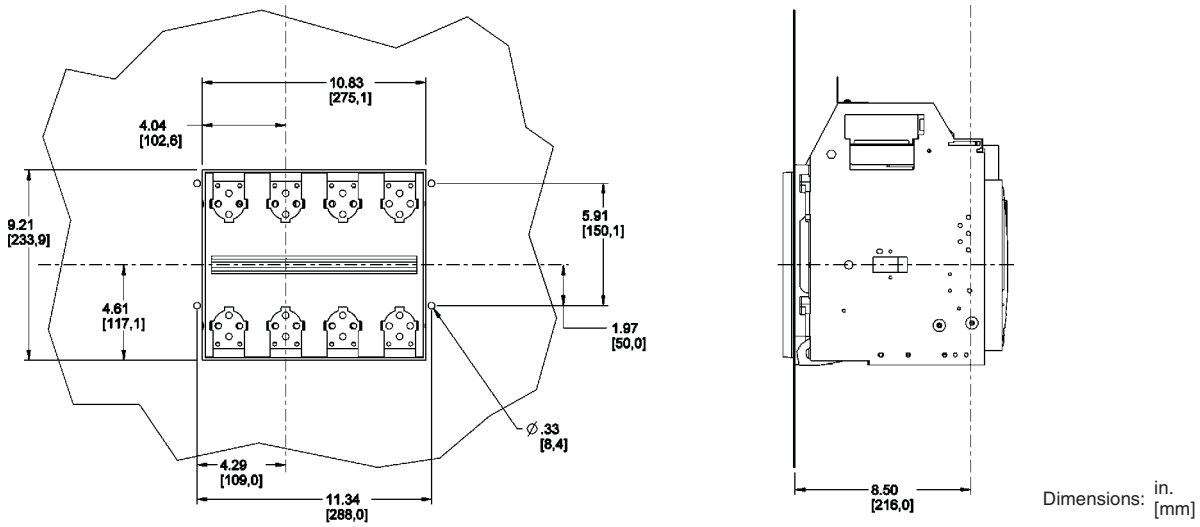
Figure 59: 800–1200 A Masterpact NT IEC 4P Drawout—Rear Cutout Dimensions



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IEC 4P Fixed Circuit Breakers

Figure 60: 800–1600 A Masterpact NT 4P Fixed—Master Drawing

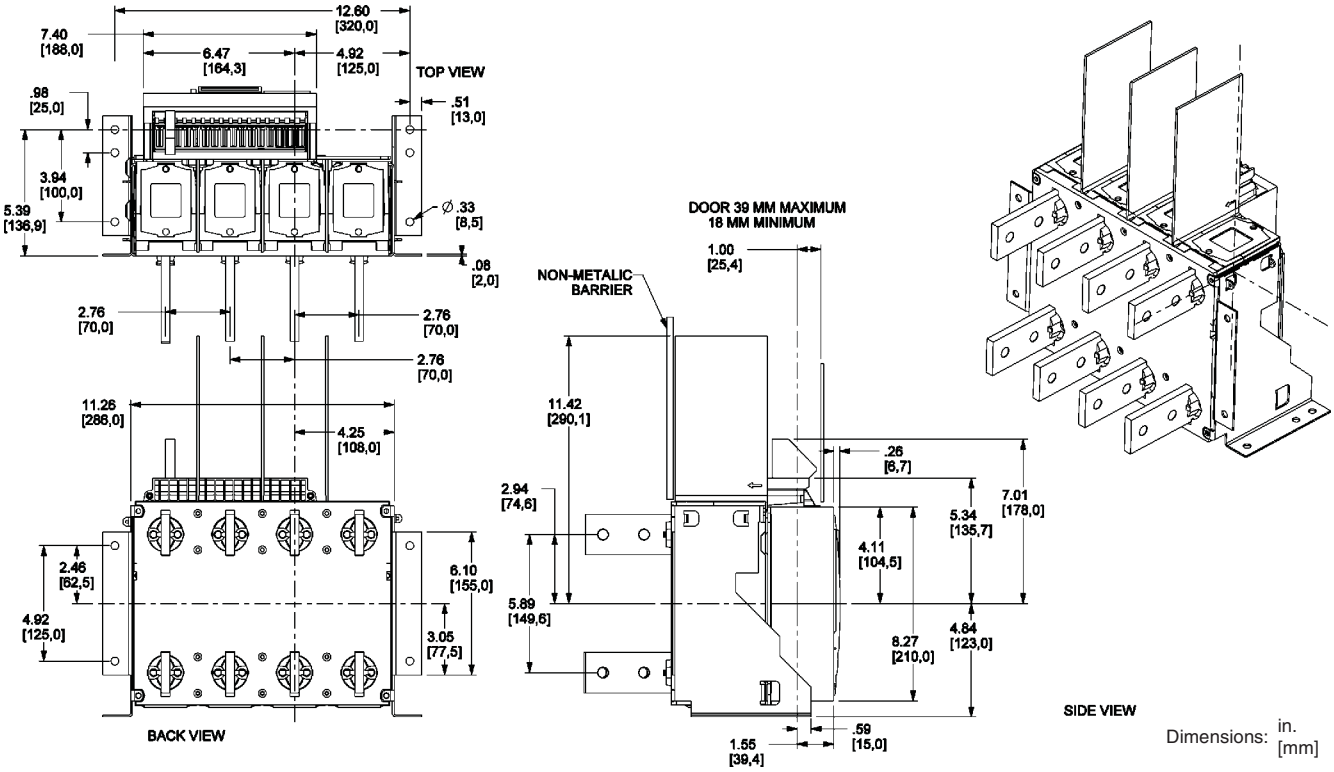

Figure 61: 800–1600 A Masterpact NT IEC 4P Fixed—RCTV Rear-Connected "T" Vertical

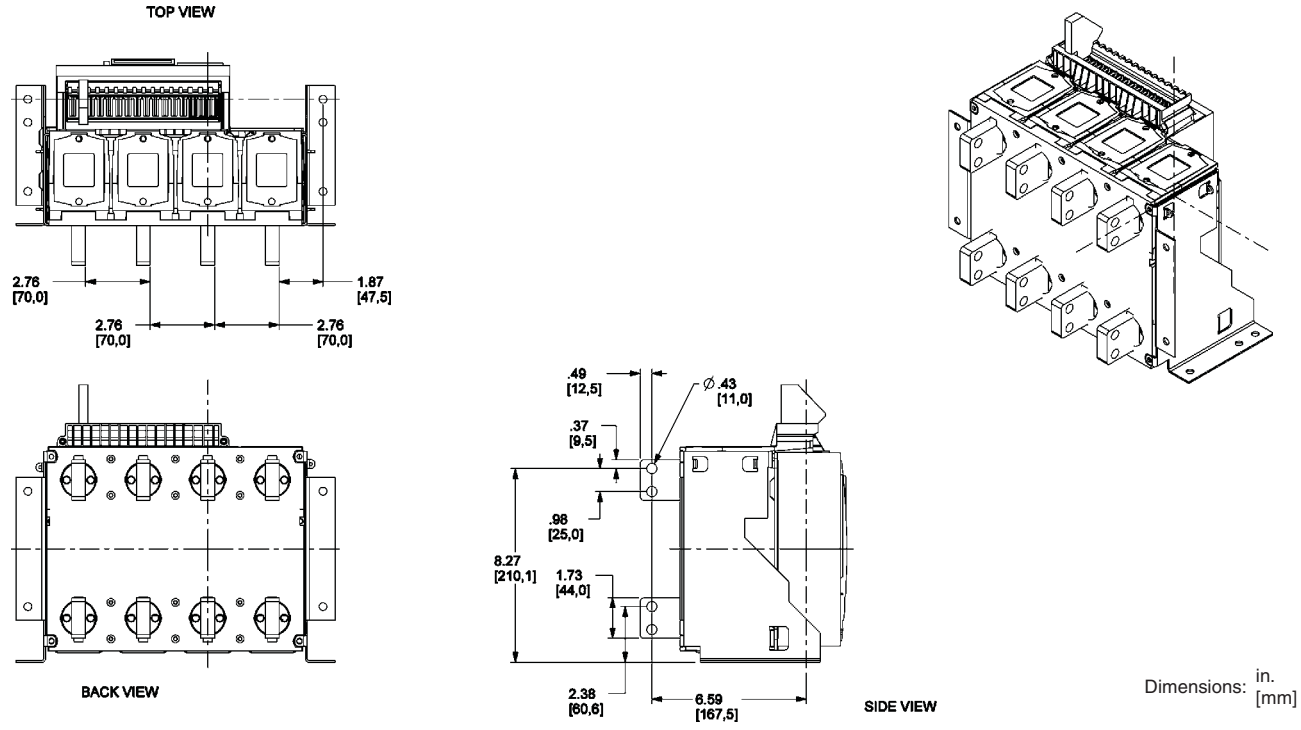

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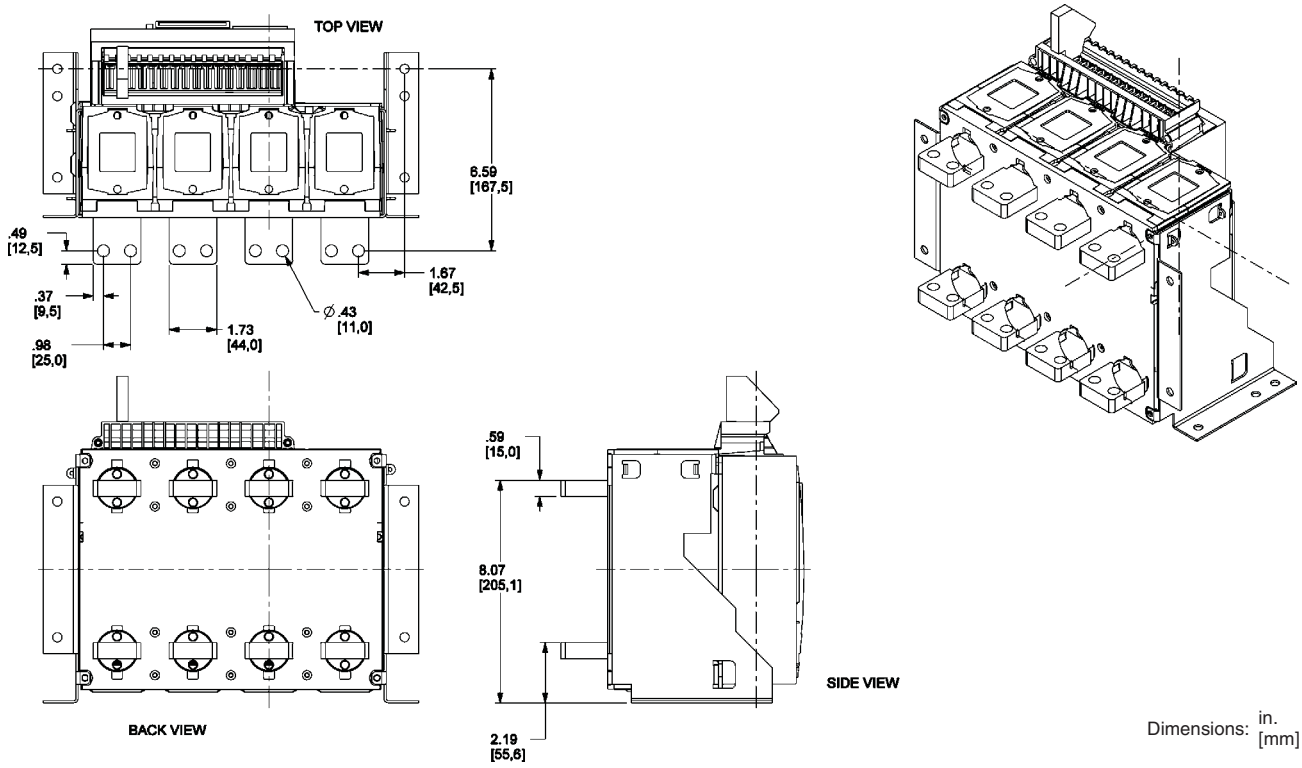
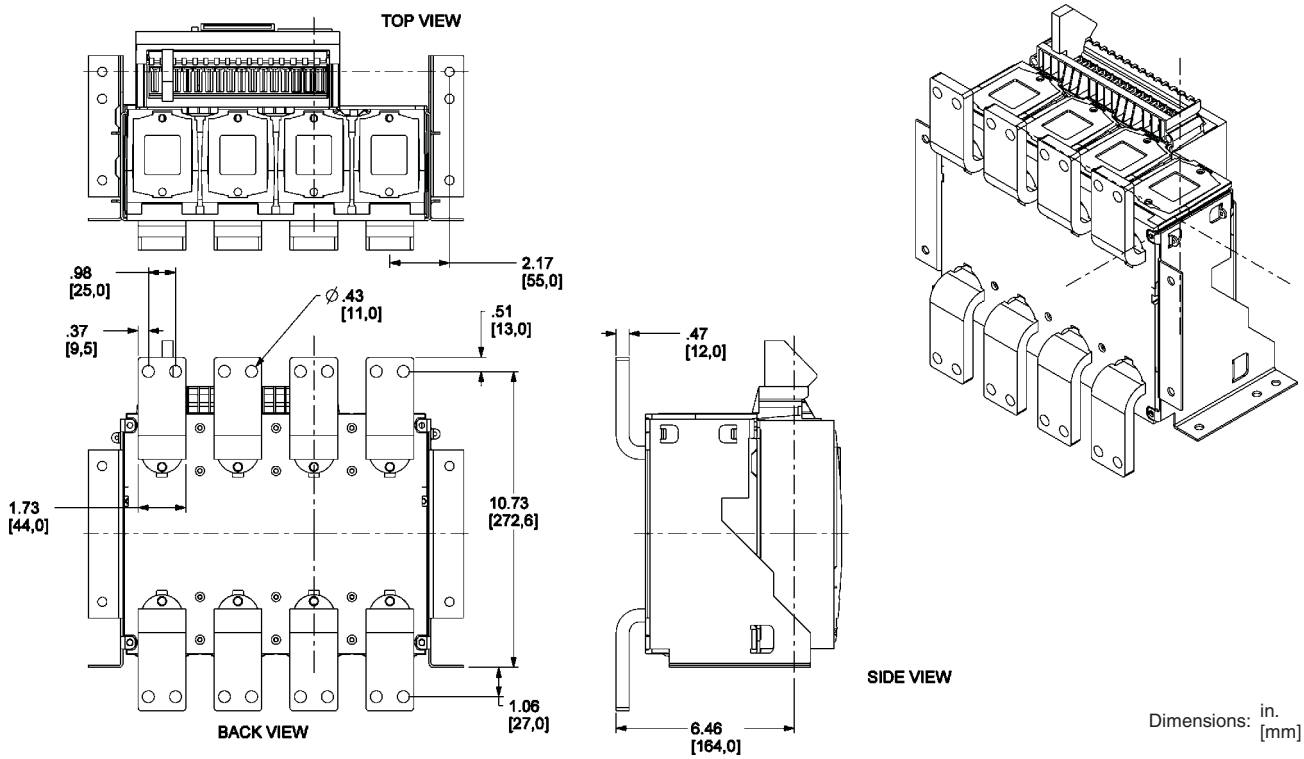
Figure 62: 800–1600 A Masterpact NT IEC 4P Fixed—RCTH Rear-Connected "T" Horizontal



Dimensions: in. [mm]

Figure 63: 800–1600 A Masterpact NT IEC 4P Fixed—FCF Front-Connected Flat



Dimensions: in. [mm]

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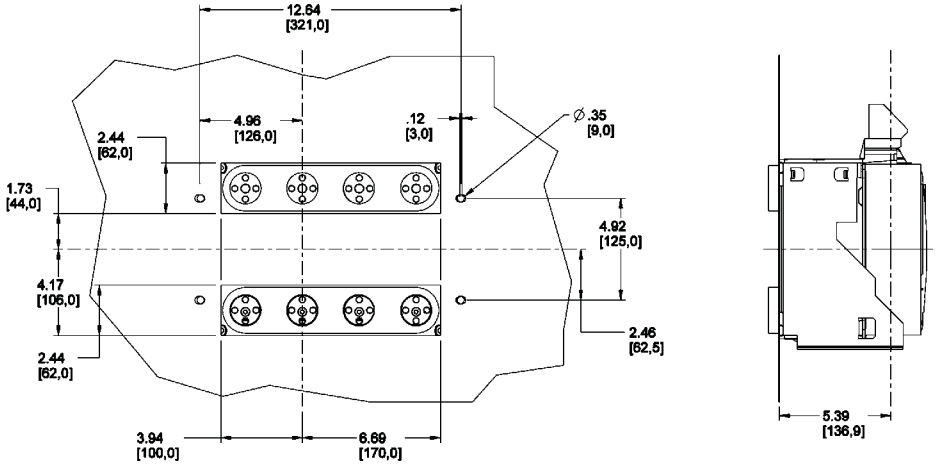
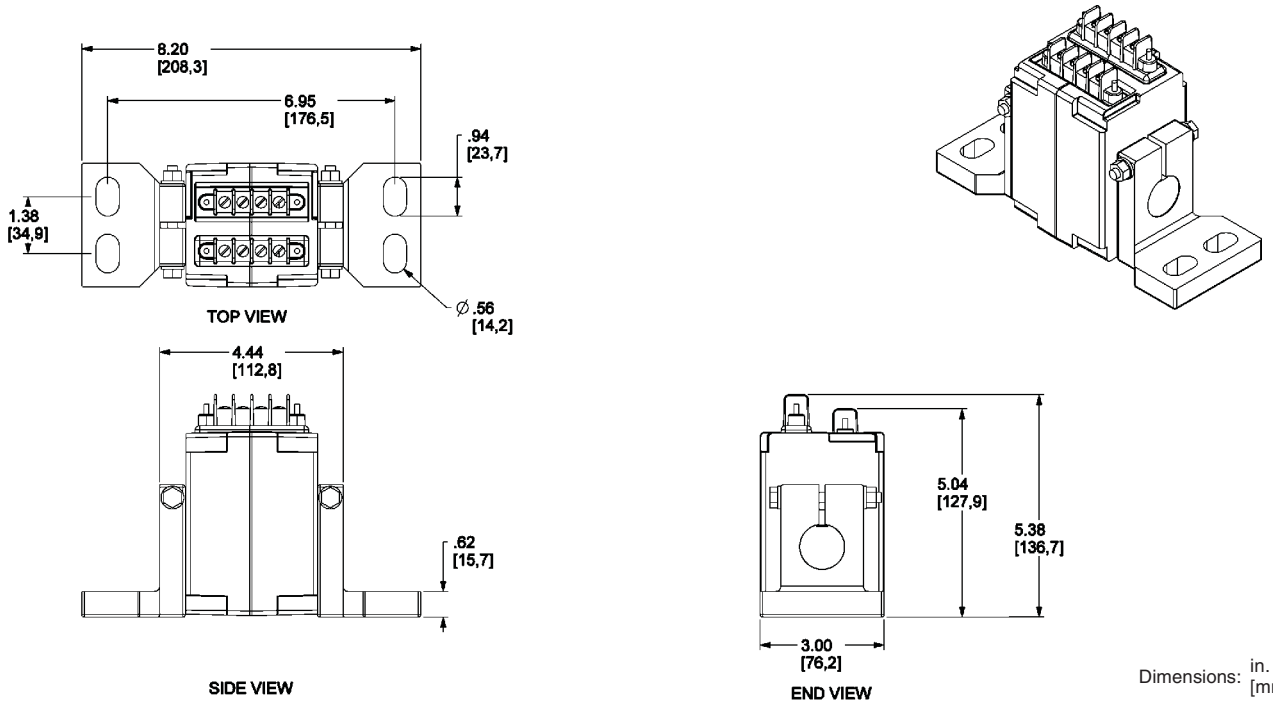
Figure 64: 800–1200 A Masterpact NT IEC 4P Fixed—Rear Cutout Dimensions



Dimensions: in. [mm]

Neutral Current Transformers

Figure 65: 800–1600 A External Neutral Current Transformer



Dimensions: in. [mm]

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Figure 66: 800–1600 A External Neutral Current Transformer (Switchboards and Switchgear)

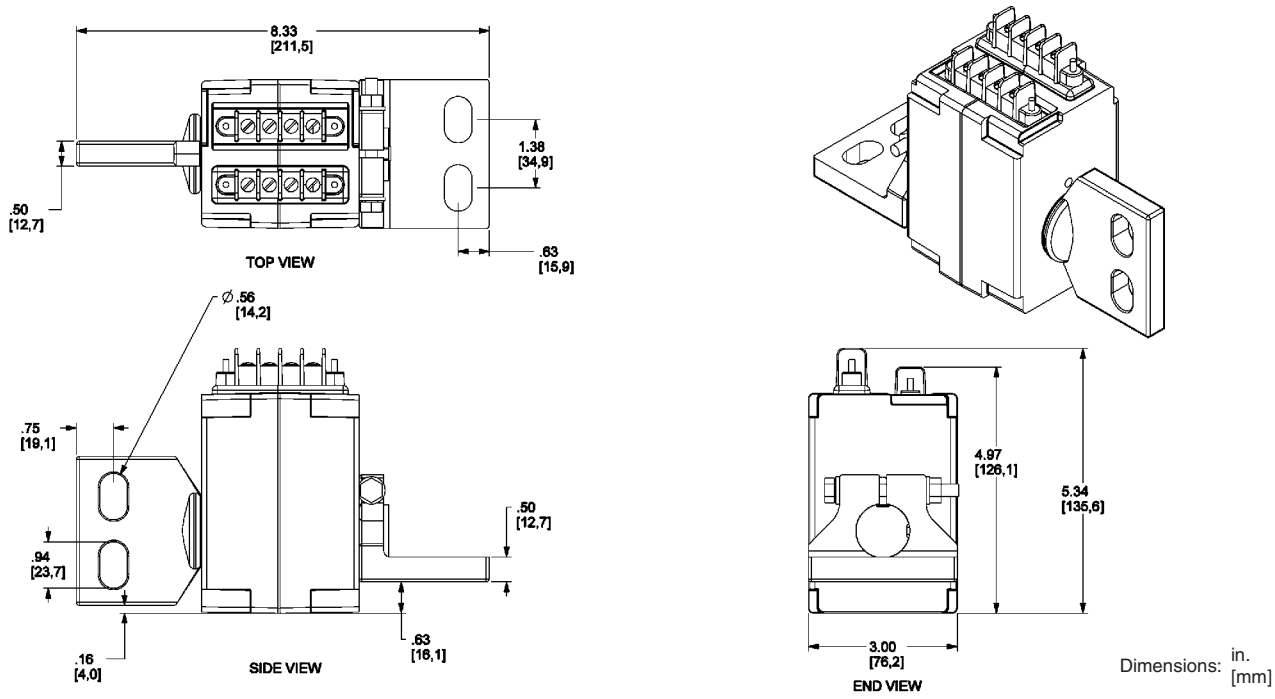
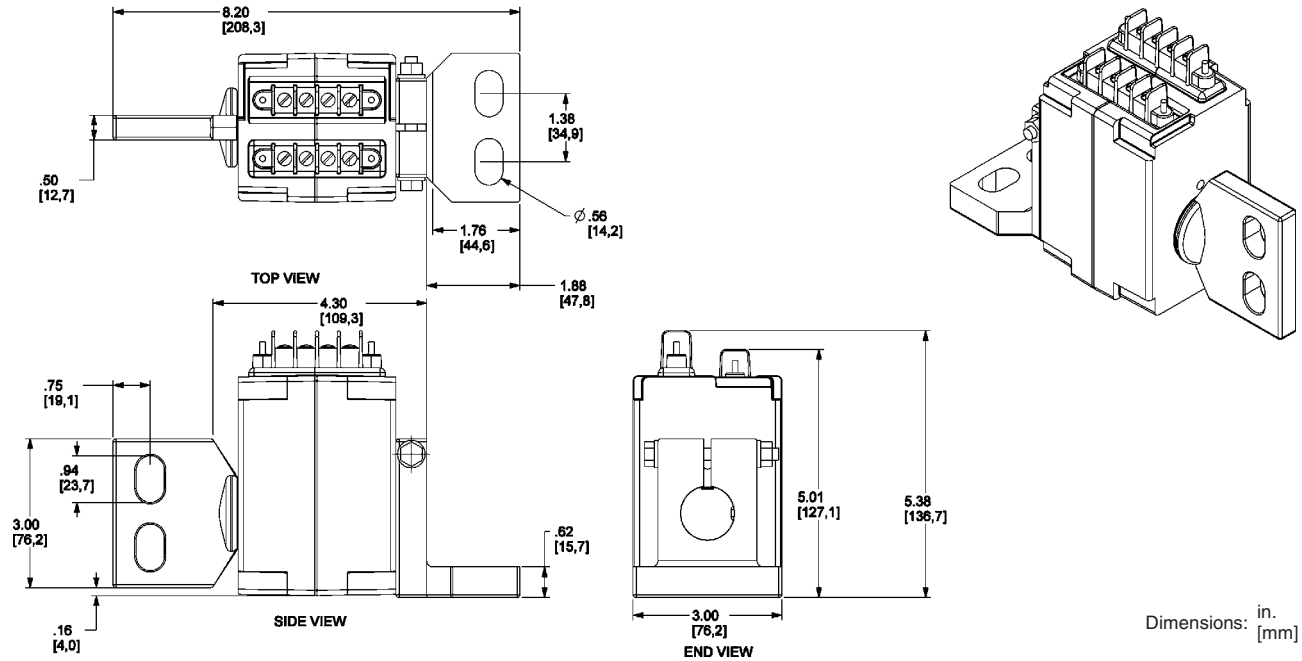


Figure 67: 800–1600 A External Neutral Current Transformer (Panelboards)



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Enclosure Information

Table 61: Minimum Enclosure Information

Number of Poles	Circuit Breaker Rating	Circuit Breaker Enclosure Dimensions (H x W x D)		Ventilation Area					
				Top		Bottom		Front Face	
		in.	mm	in.^{2}	mm^2	in.^{2}	mm^2	in.^{2}	mm^2
3P	2000 A and below, UL 1066 (ANSI C37.50)	21.25 x 21.75 x 15.75	539.8 x 552.5 x 400	59.62	38 460	35.62	22 980	—	—
	3000 A and below, UL 489	18.37 x 24.00 x 15.75	466.6 x 609.6 x 400	16.62	10 720	16.62	10 720	—	—
	3200 A, and 4000 A (W-Frame) UL 1066 (ANSI C37.50)	31.00 x 21.75 x 15.75	787.4 x 552.5 x 400	59.62	38 460	—	—	93.6	60 390
	4000–5000 A, UL 1066 (ANSI C37.50)	33.00 x 32.62 x 15.75	838.2 x 828.5 x 400	198.75	128 230	—	—	130.5	84 190
	4000–6000 A, UL 489	21.75 x 36.00 x 15.75	552.5 x 914.4 x 400	16.62	10 720	16.62	10 720	—	—
4P	2000 A and below, UL 1066 (ANSI C37.50)	21.25 x 26.28 x 15.75	539.8 x 667.5 x 400	59.62	38 460	35.62	22 980	—	—
	3000 A and below, UL 489	18.37 x 30.00 x 15.75	466.6 x 762.0 x 400	16.62	10 720	16.62	10 720	—	—
	3200 A, and 4000 A (W-Frame) UL 1066 (ANSI C37.50)	31.00 x 26.28 x 15.75	787.4 x 667.5 x 400	59.62	38 460	—	—	93.6	60 390
	4000–5000 A, UL 1066 (ANSI C37.50)	33.00 x 41.68 x 15.75	838.2 x 1058.7 x 400	198.75	128 230	—	—	130.5	84 190
	4000–6000 A, UL 489	21.75 x 45.00 x 15.75	552.5 x 1168.4 x 400	16.62	10 720	16.62	10 720	—	—

UL®/ANSI 3P Drawout Circuit Breakers

Figure 68: 800–3000 A and 4000 A (H1, H2, H3) Master Drawing

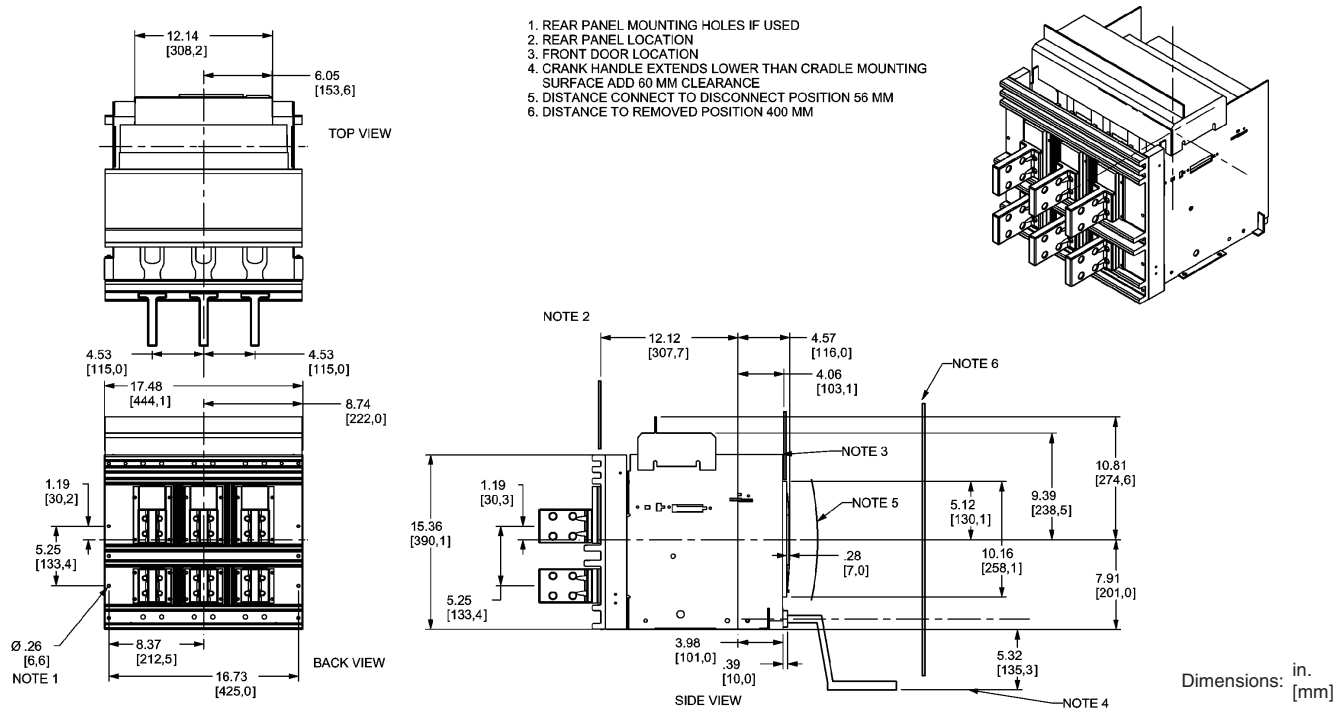

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Figure 69: 800–2000 A Rear-Connected "T" Vertical (RCTV)

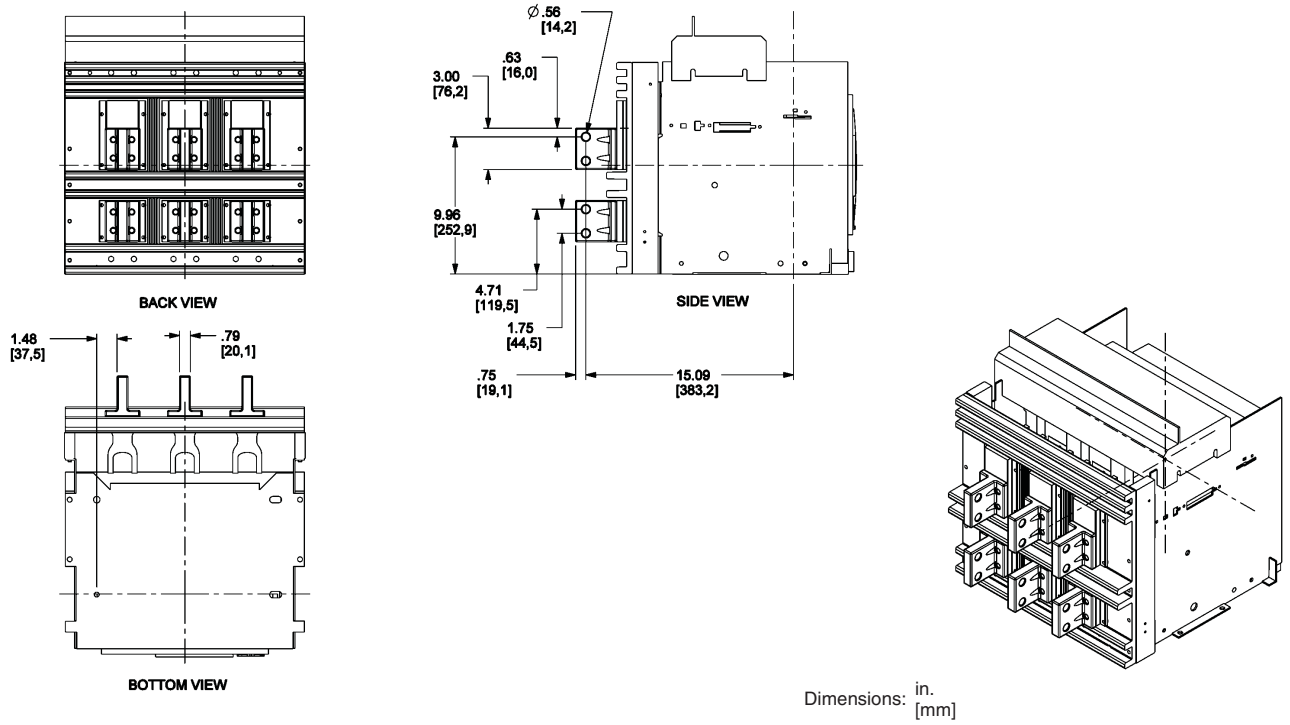

Figure 70: 800–2000 A Rear-Connected "T" Horizontal (RCTH)

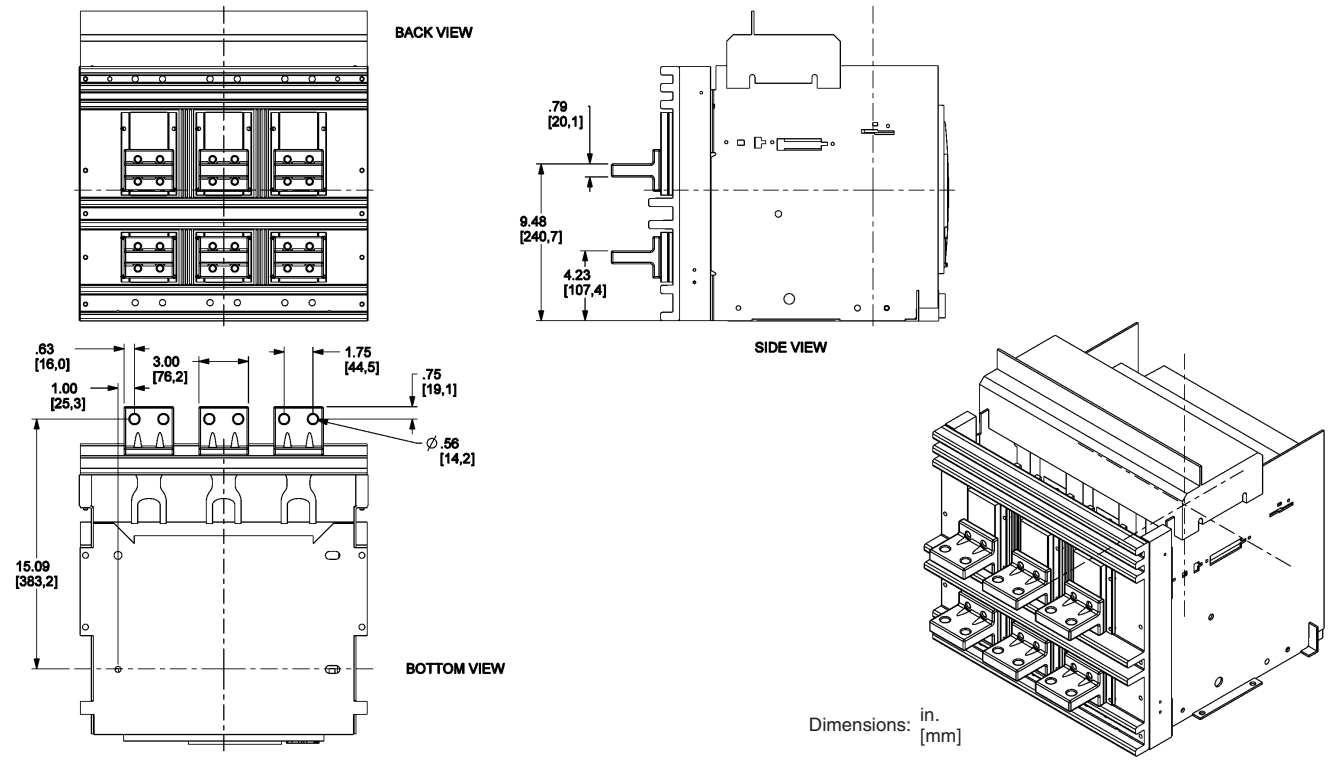

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Figure 71: 800–2000 A Front-Connected Flat (FCF)

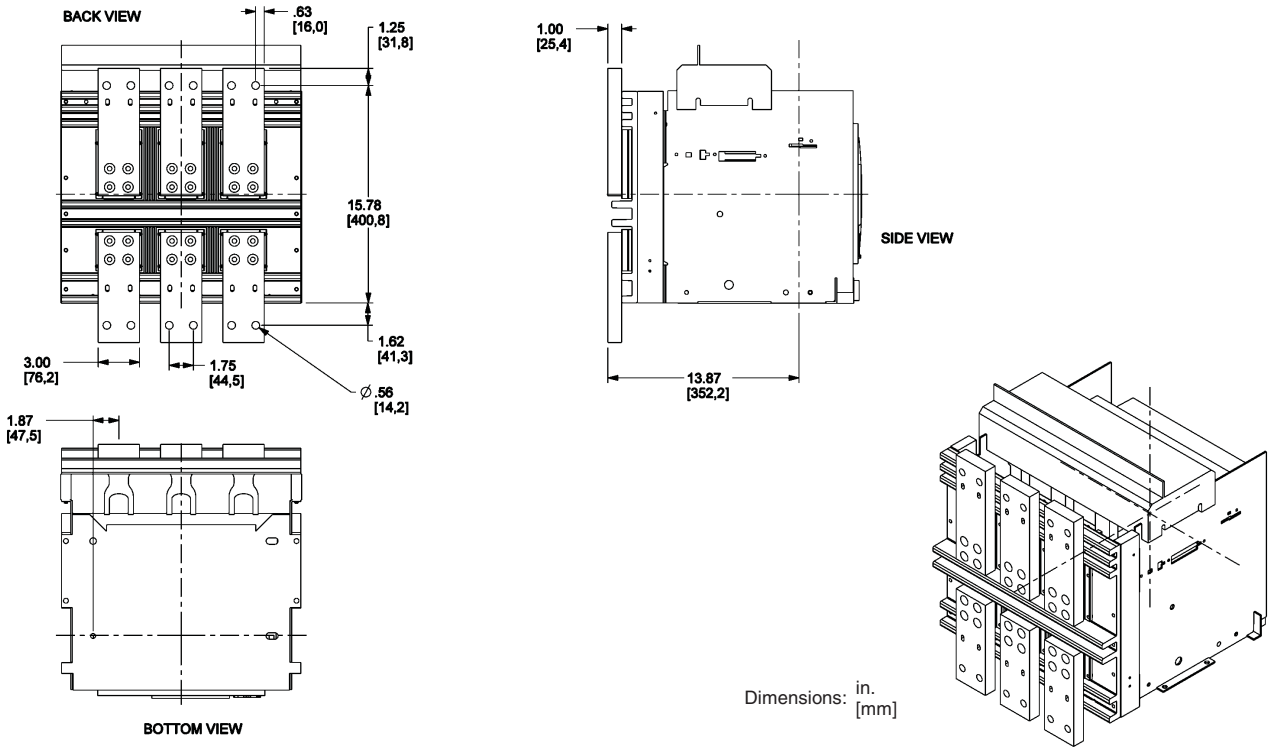

Figure 72: 800–3000 A Front-Connected "T" (FCT)

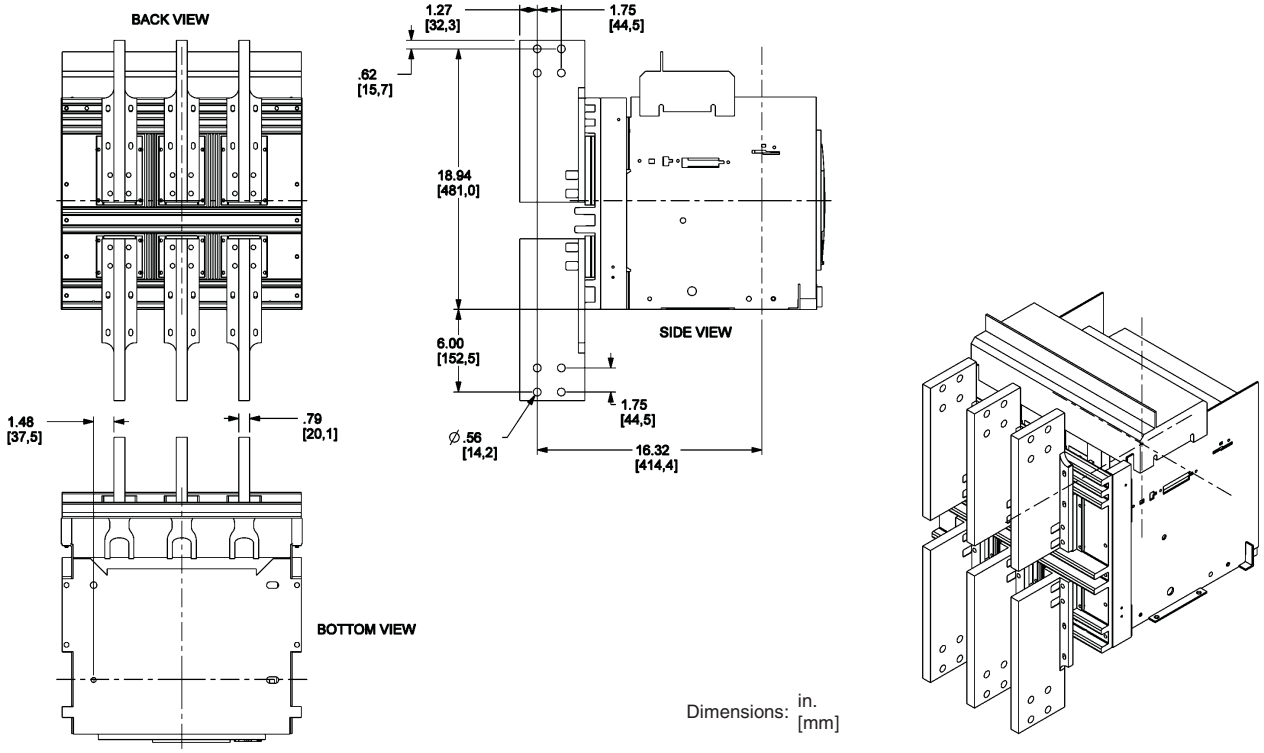

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Figure 73: 2500–3000 A Rear-Connected "T" Horizontal (RCTH)

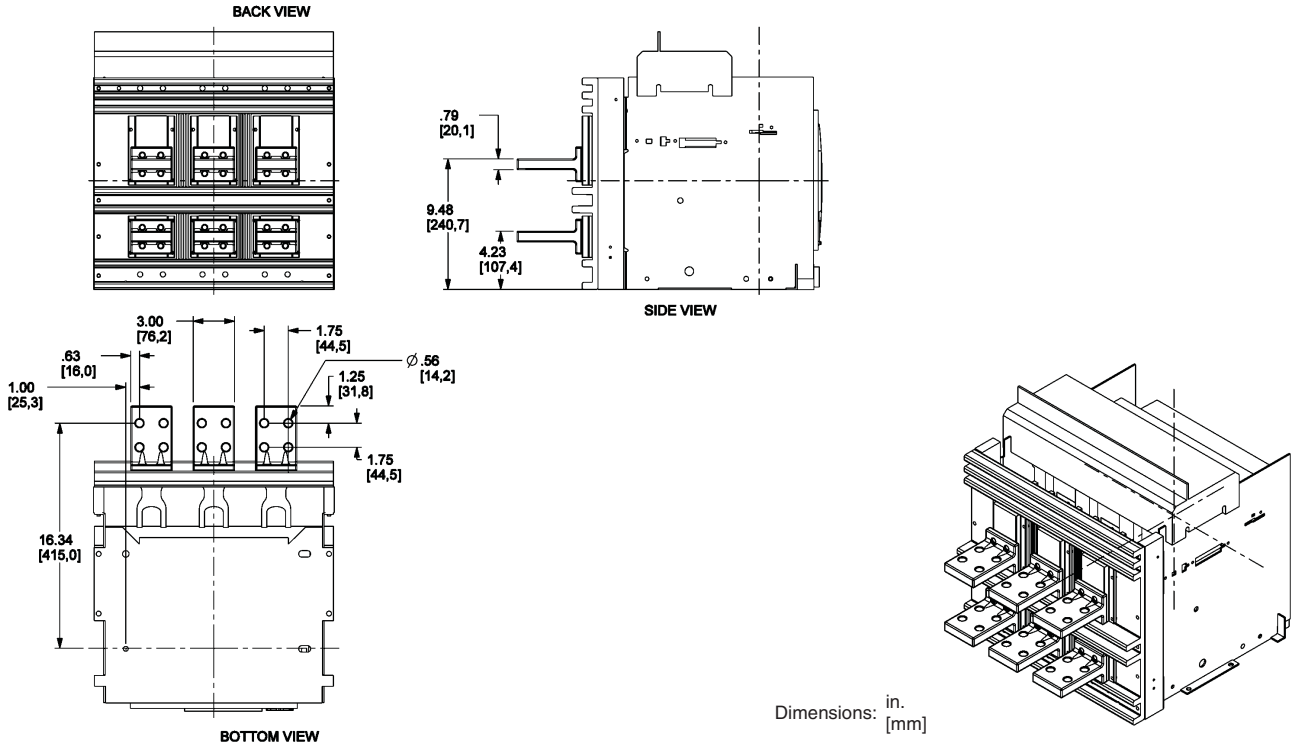

Figure 74: 2000 A L1 and 3200 A Rear-Connected Offset Vertical (RCOV)

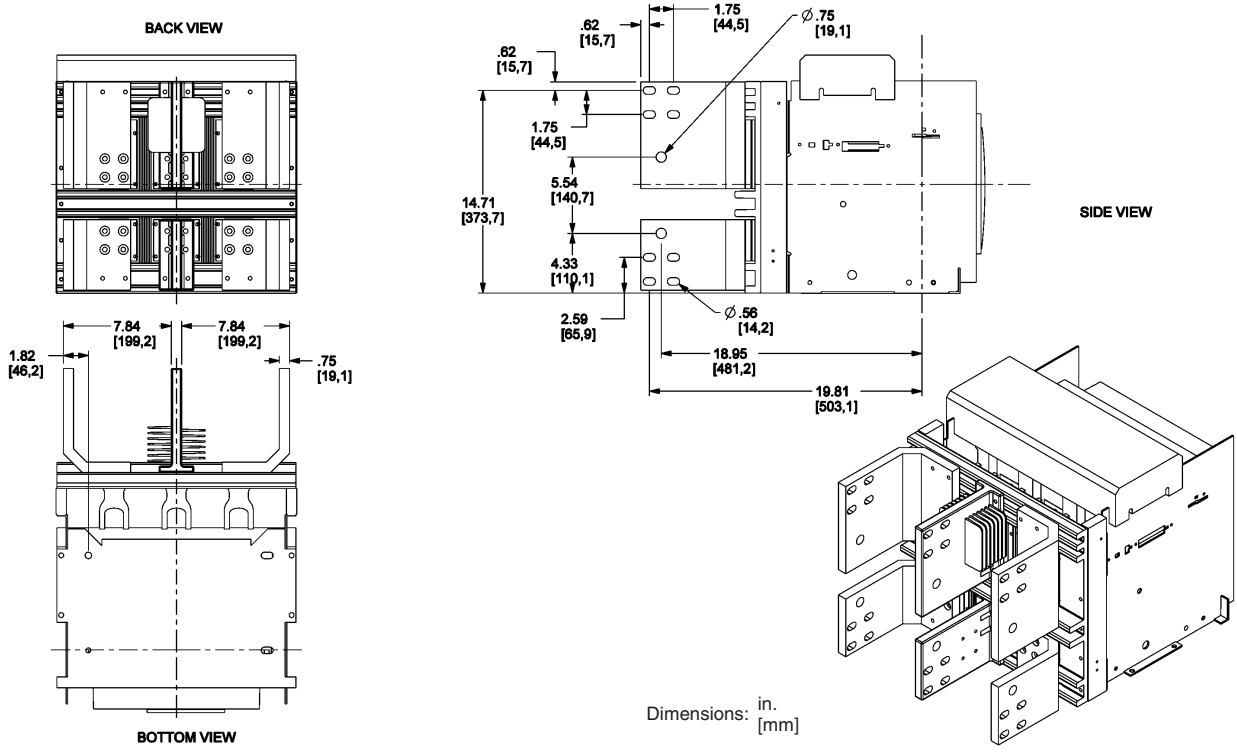

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Figure 75: 2500–3000 A Rear-Connected "T" Vertical (RCTV)

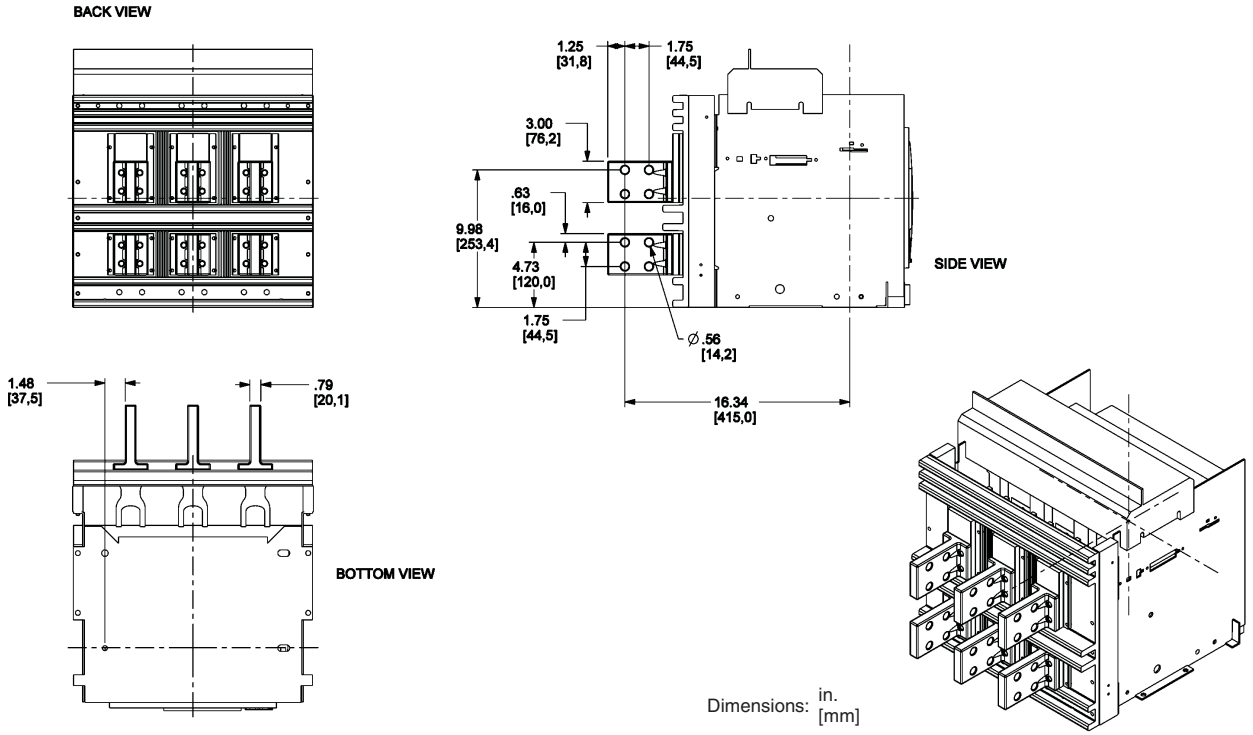

Figure 76: 3200 A L1 and 4000–6000 A Master Drawing

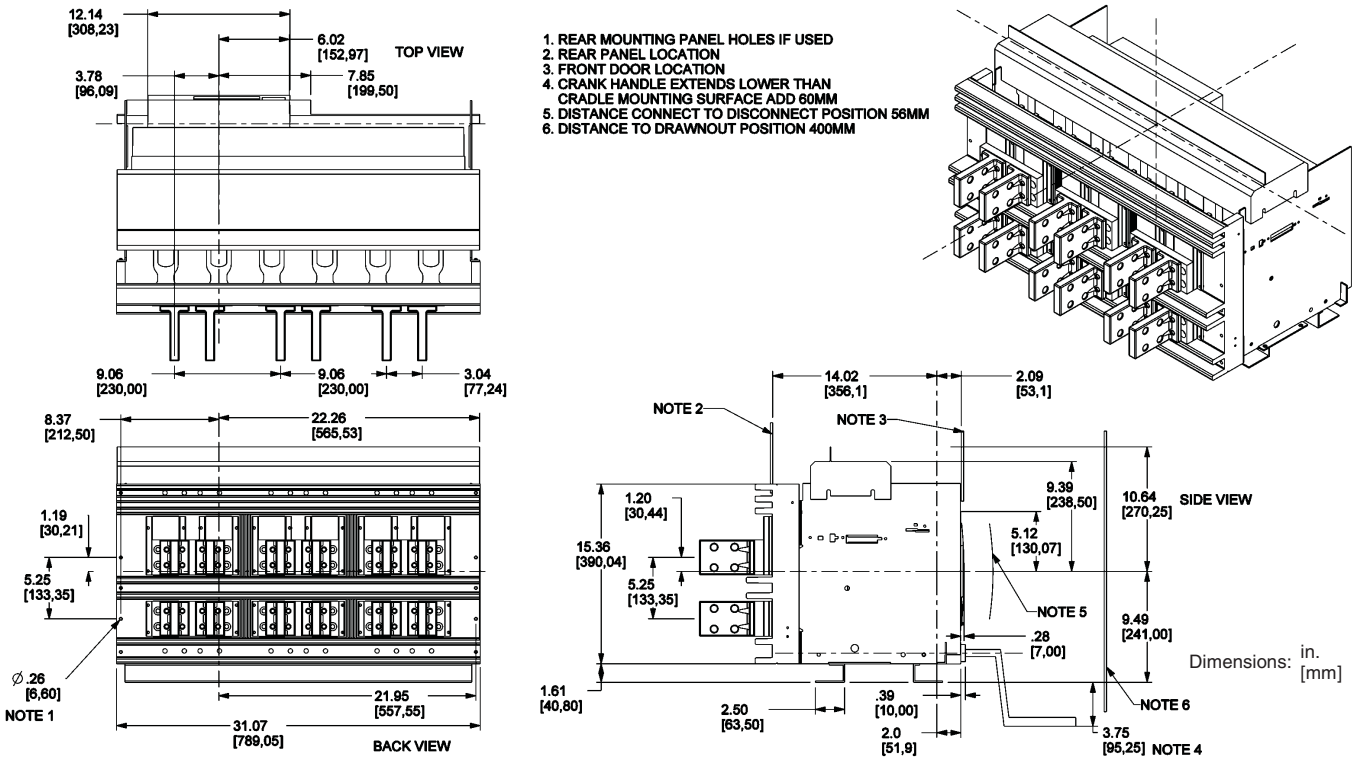

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Figure 77: 3200 A L1 and 4000–5000 A Rear-Connected "T" Vertical (RCTV)

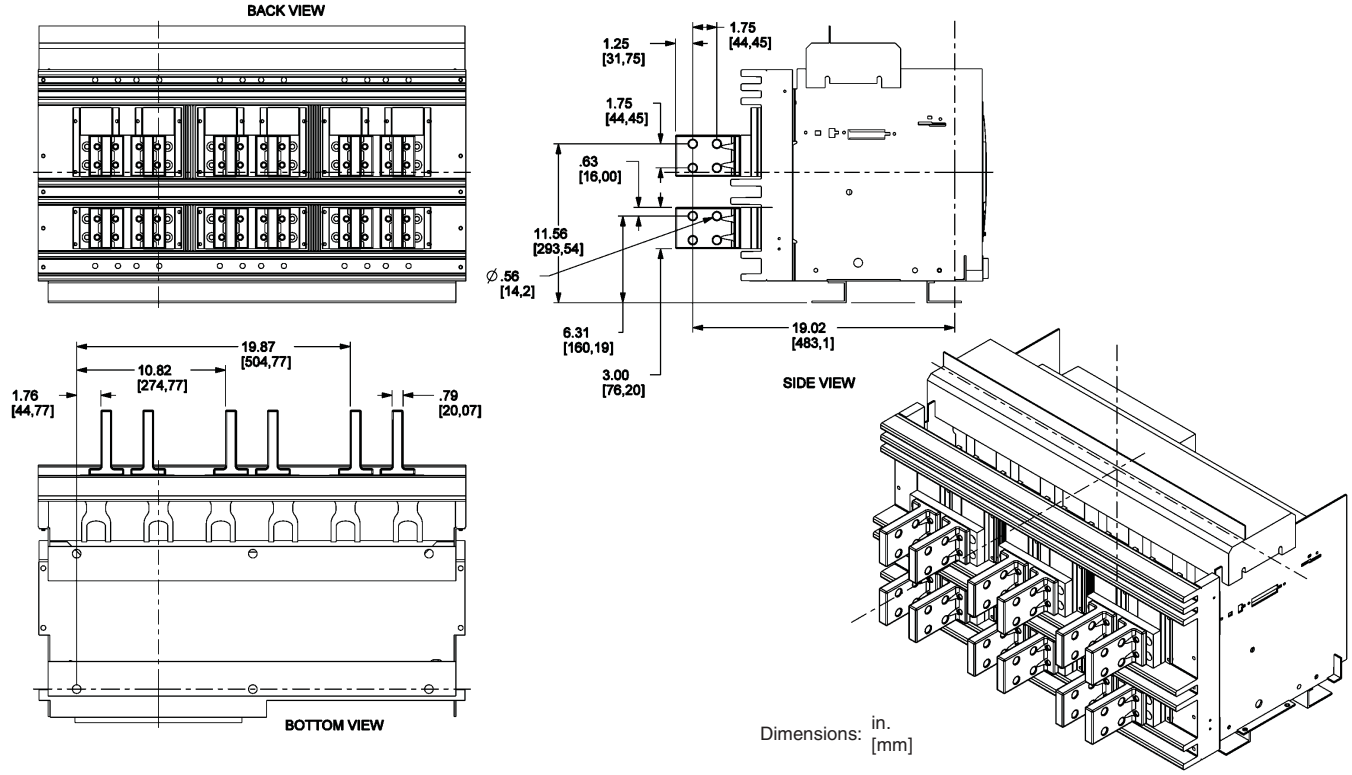

Figure 78: 3200 A L1 and 4000–5000 A Rear-Connected "T" Horizontal (RCTH)

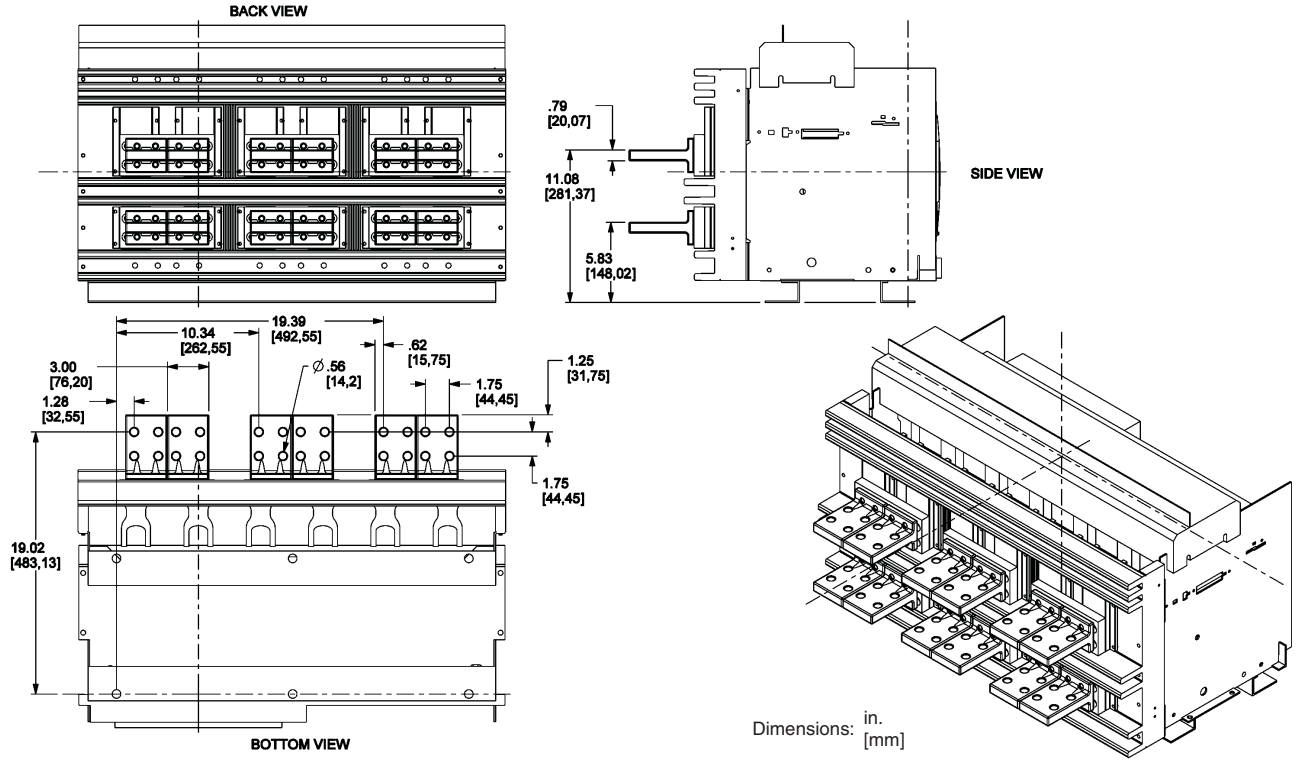

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Figure 79: 3200 A L1 and 4000 A Front-Connected Flat (FCF)

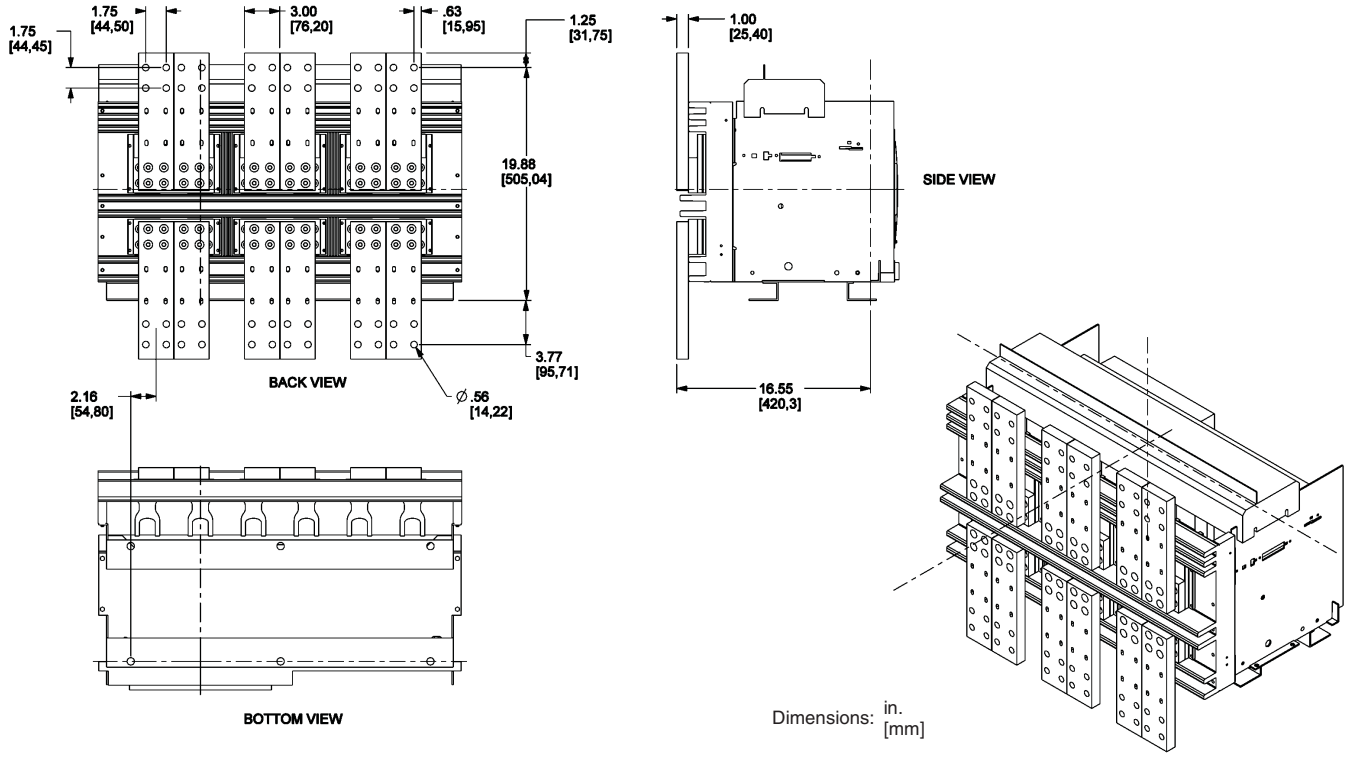

Figure 80: 3200 A L1 and 4000–5000 A Front-Connected "T" (FCT)

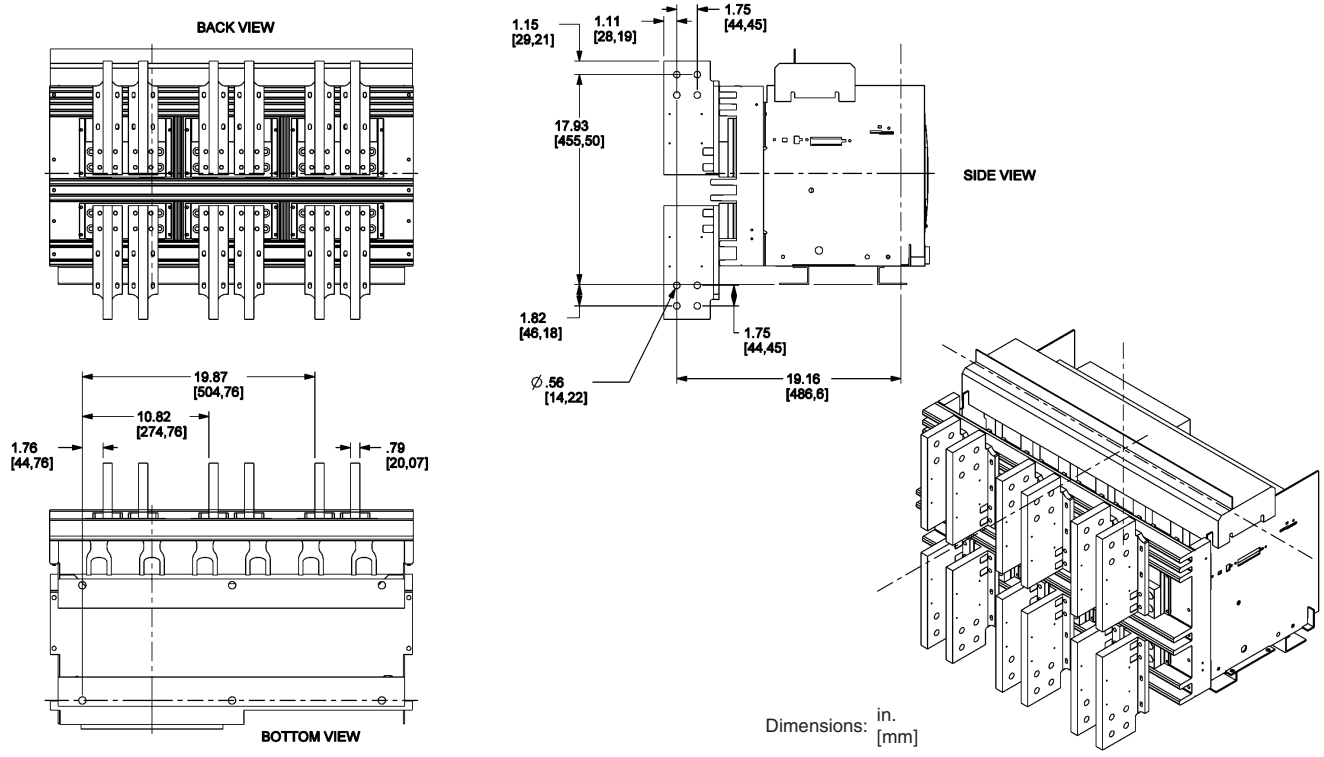

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Figure 81: 6000 A Rear-Connected "T" Vertical (RCTV)

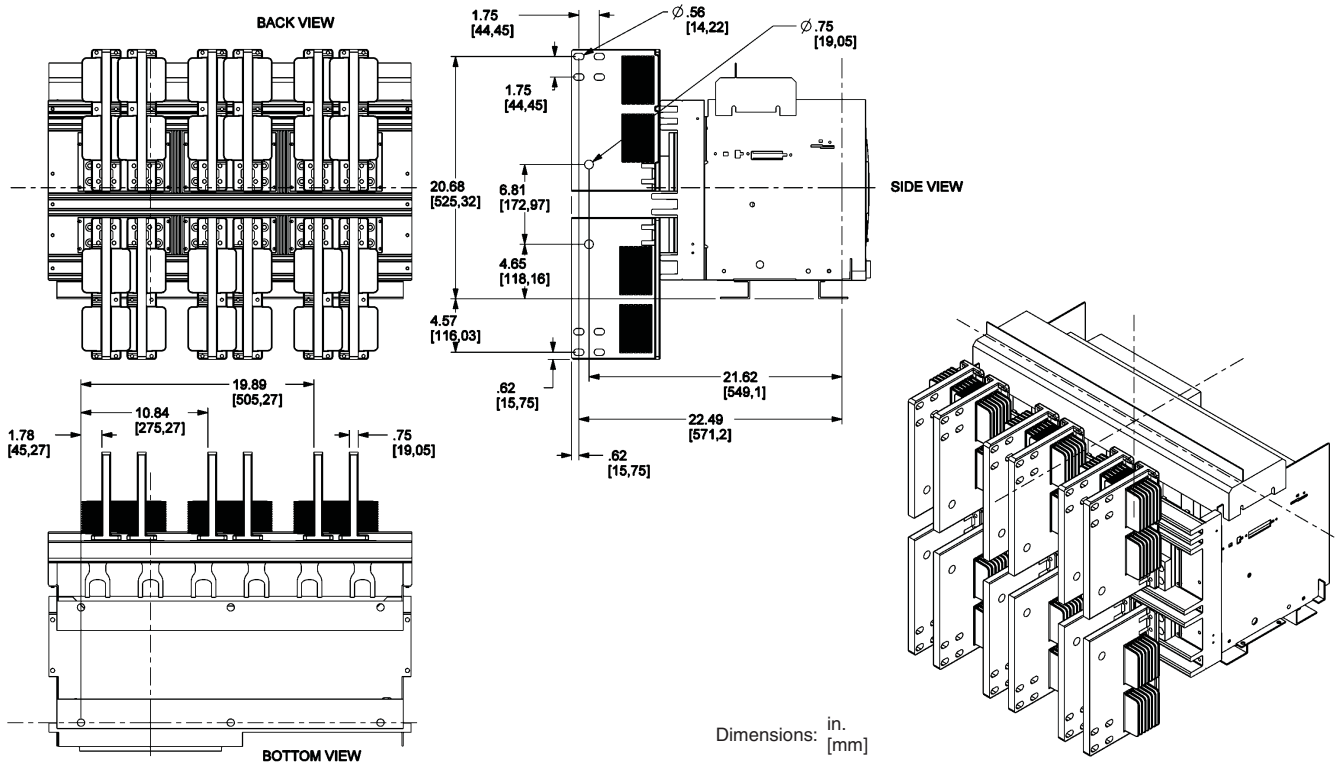

Figure 82: Drawout Cradle Mounting

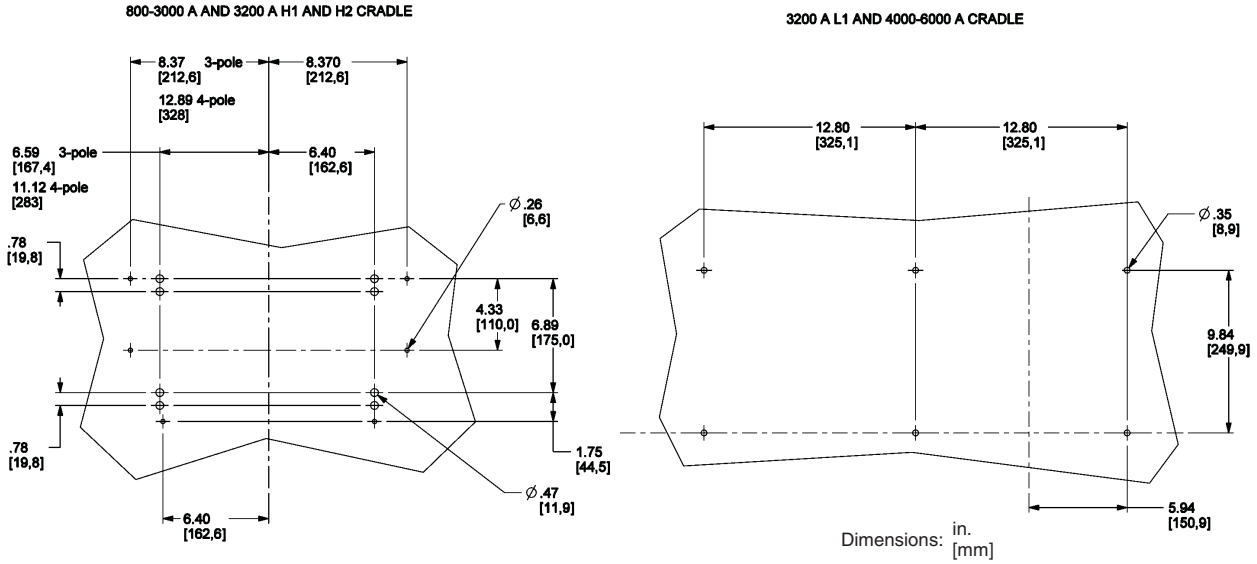

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Figure 83: 800–3000 A and 3200 A (H1, H2, H3) Door Cutout

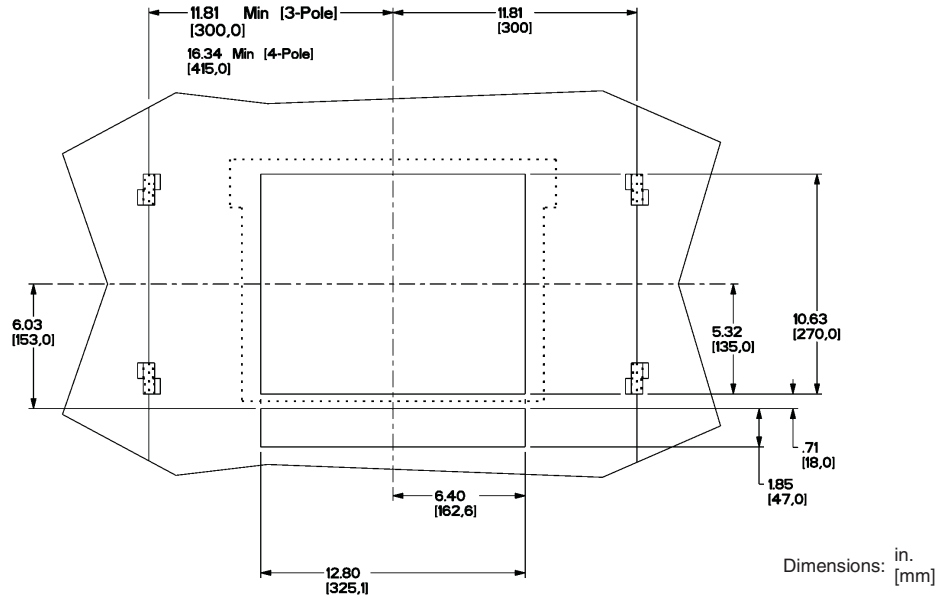

Figure 84: 3200 A L1 and 4000–6000 A Door Cutout

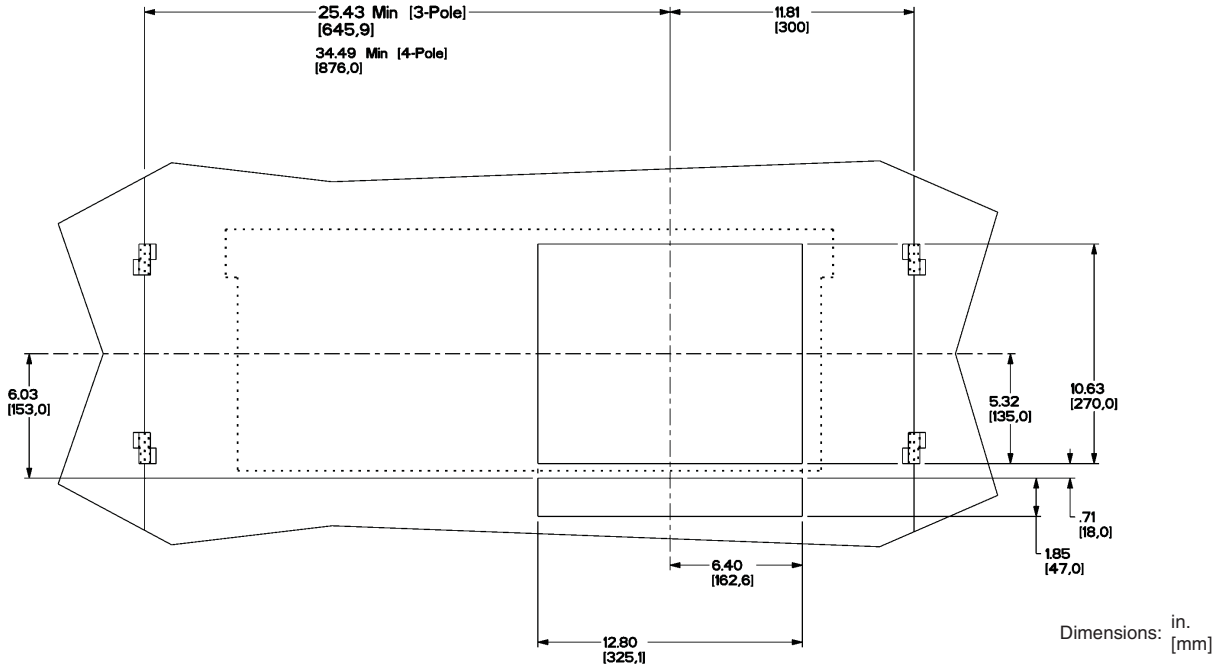

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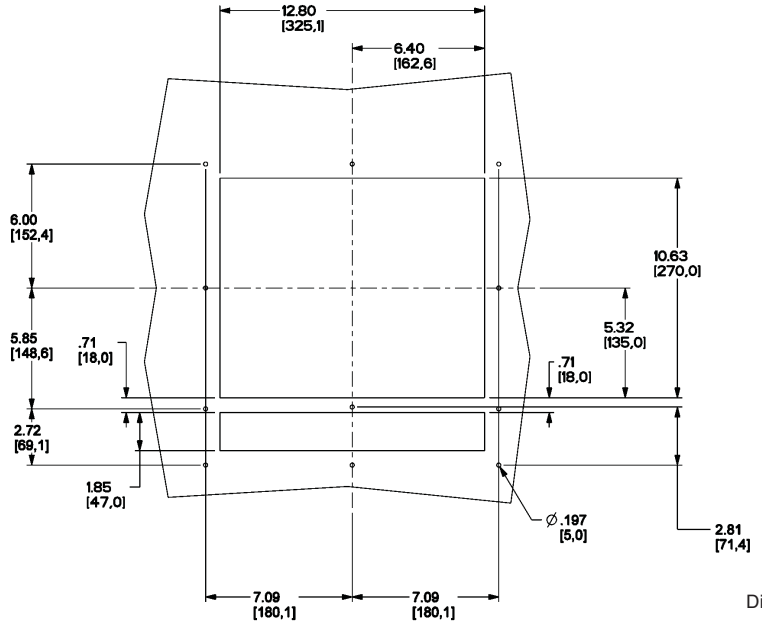
Figure 85: Door Escutcheon Hole Pattern



Dimensions: in. [mm]

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Figure 86: 800–3000 A, 3200 A and 4000 A (W-Frame) Master Drawing

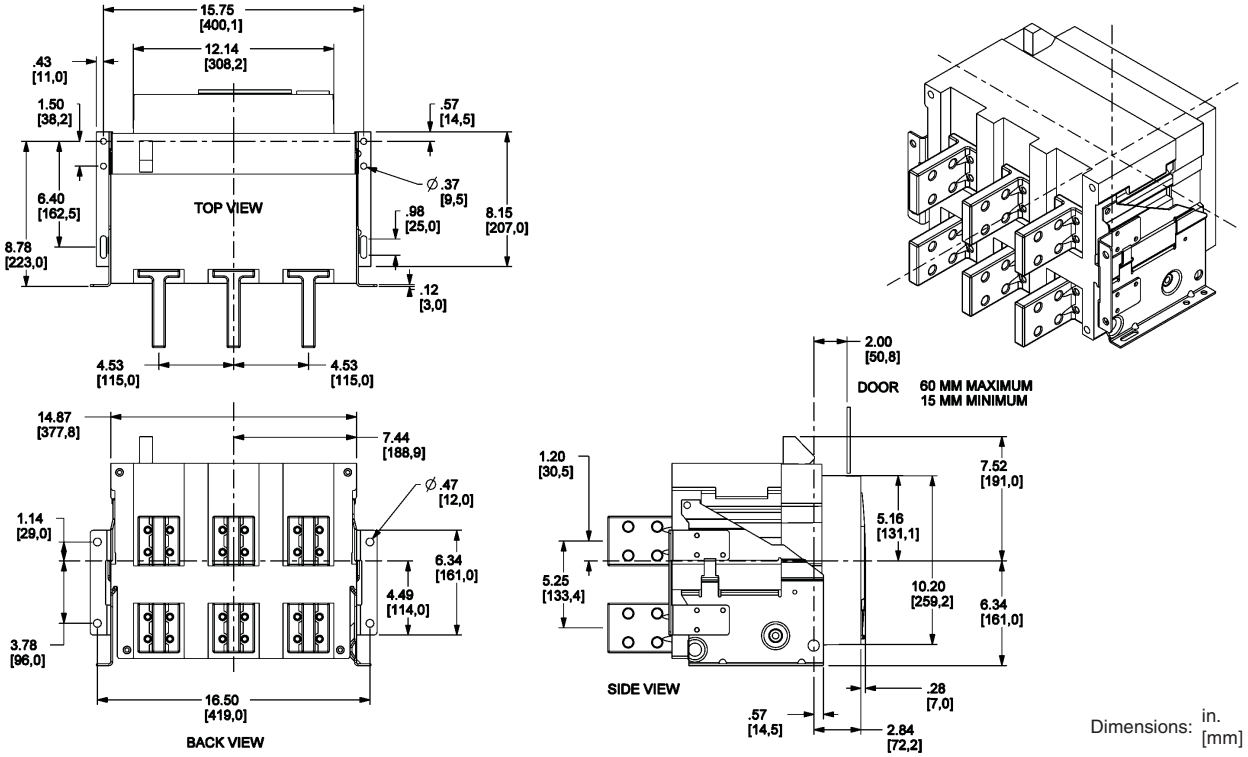

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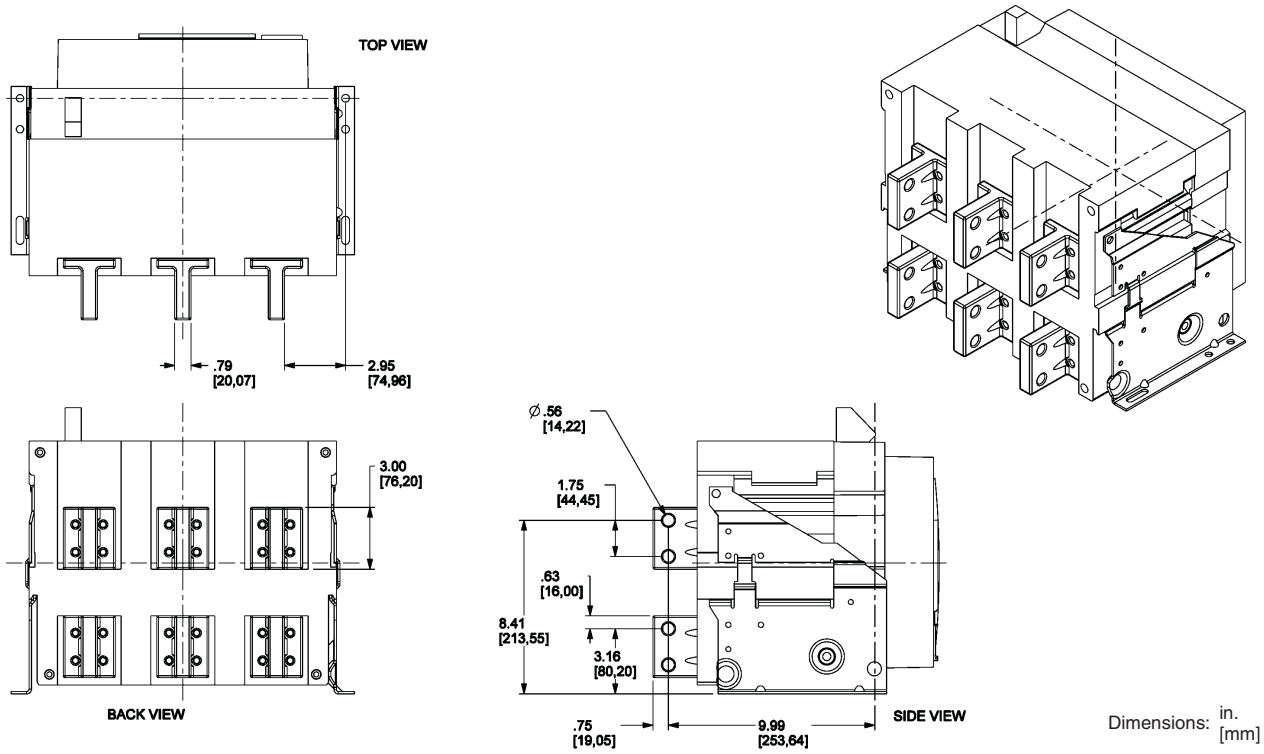
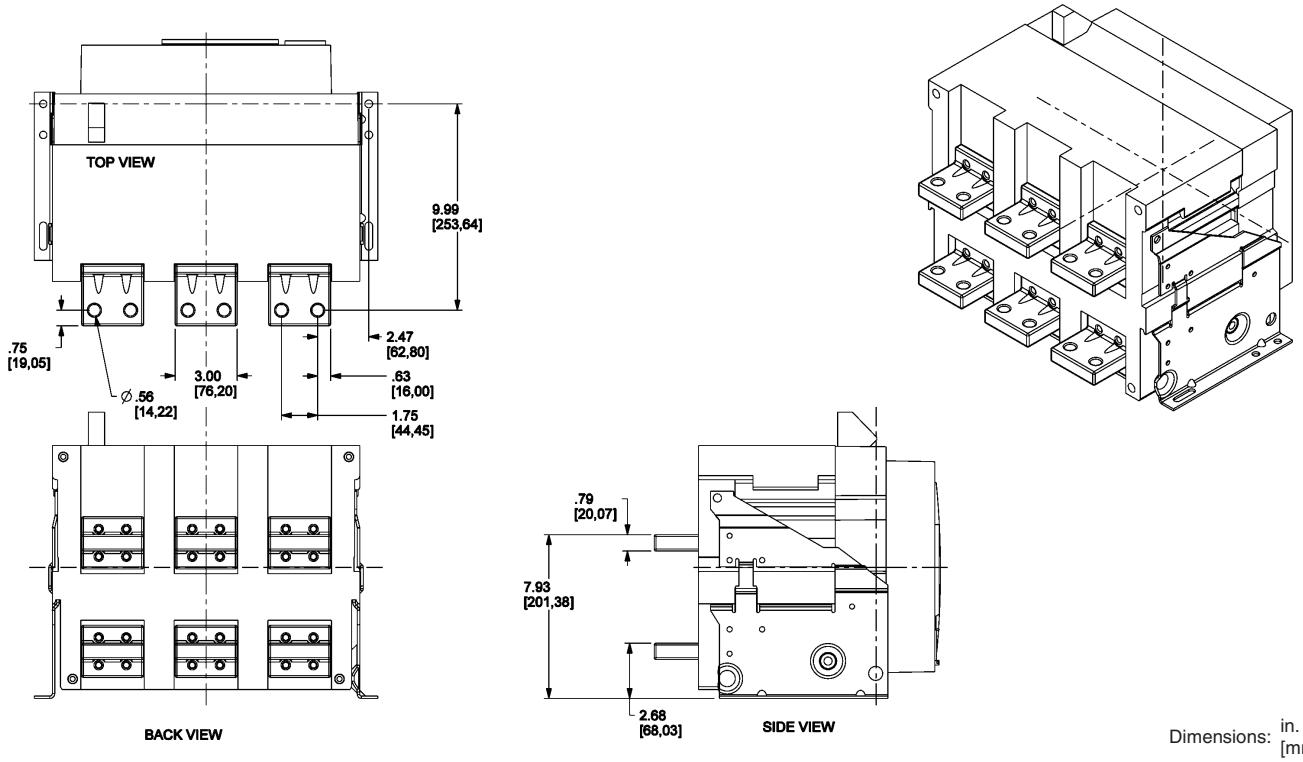
Figure 87: 800–2000 A Rear-Connected "T" Vertical (RCTV)



Dimensions: in. [mm]

Figure 88: 800–2000 A Rear-Connected "T" Horizontal (RCTH)



Dimensions: in. [mm]

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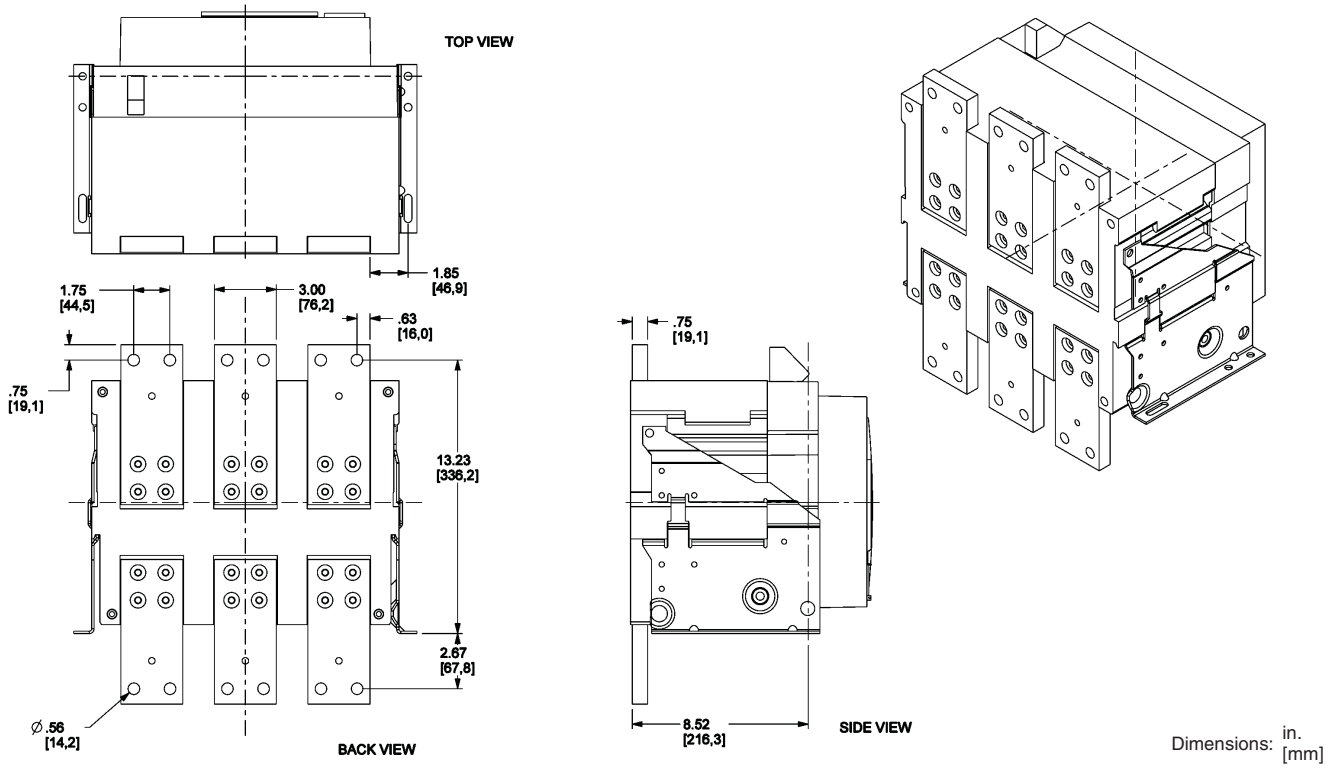
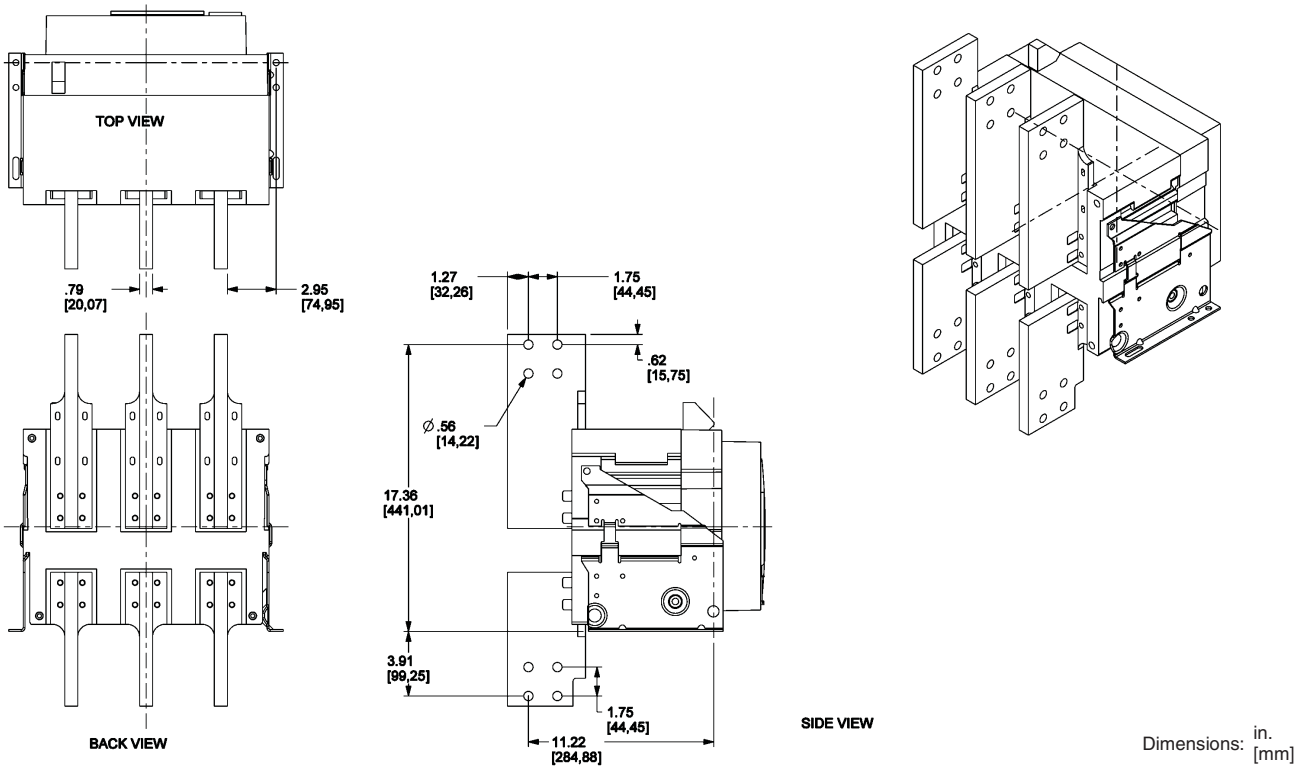
Figure 89: 800–2000 A Front-Connected Flat (FCF)



Dimensions: in. [mm]

Figure 90: 800–3000 A Front-Connected "T" (FCT)



Dimensions: in. [mm]

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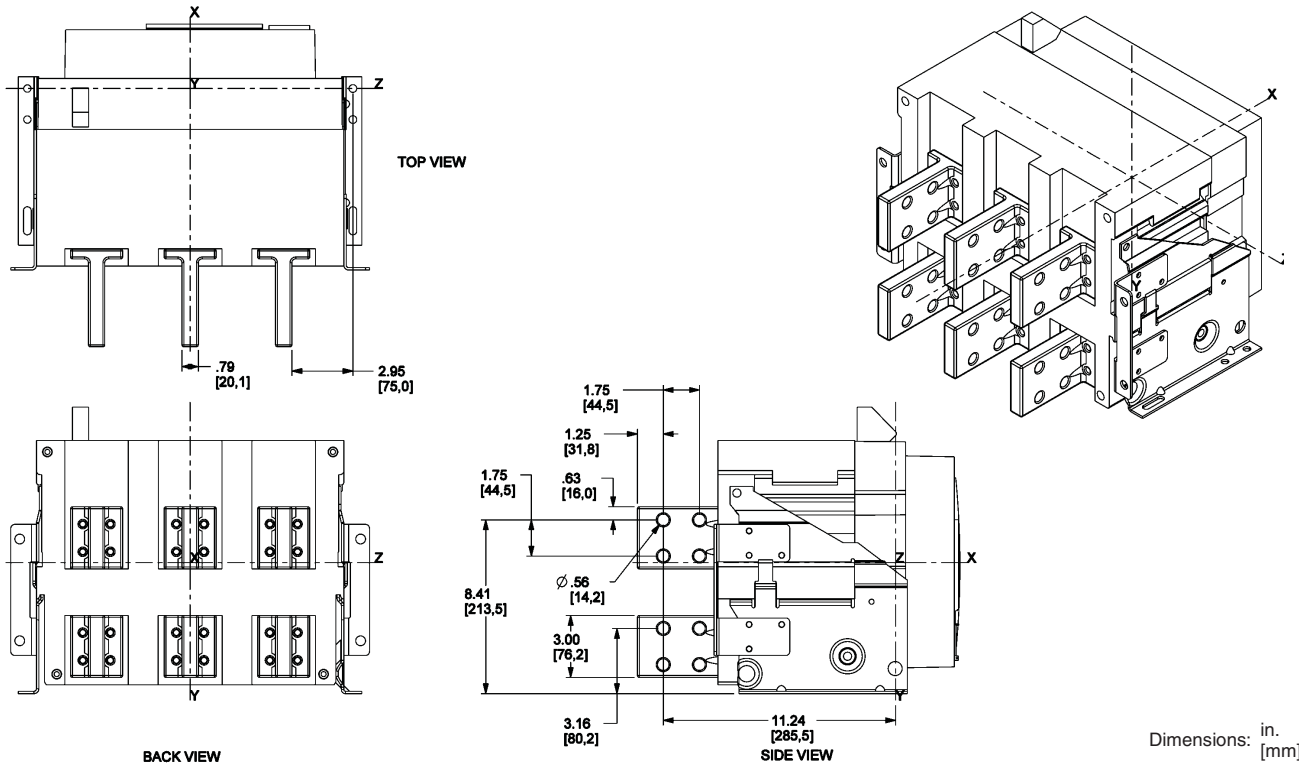
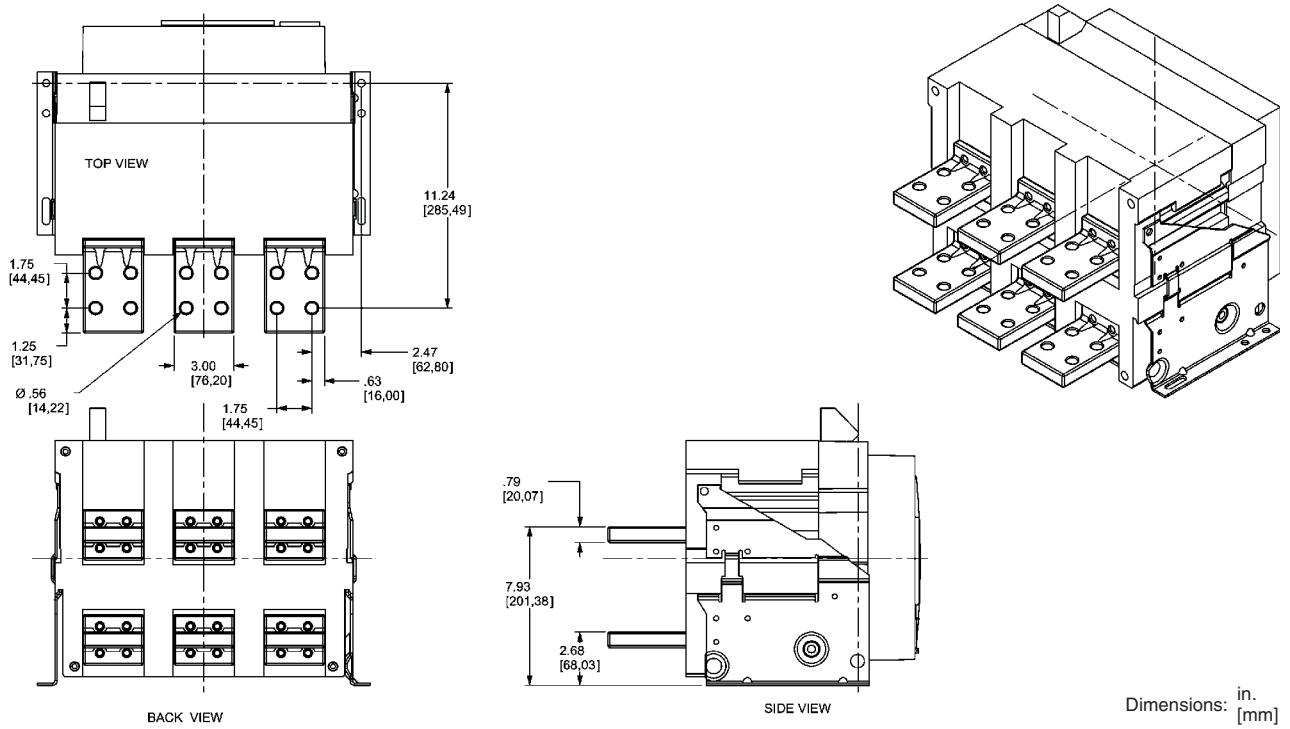
Figure 91: 2500–3000 A Rear-Connected Vertical "T" Horizontal (RCTV)



Dimensions: in. [mm]

Figure 92: 2500–3000 A Rear-Connected "T" Horizontal (RCTH)



Dimensions: in. [mm]

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Figure 93: 2000 A L1 and 3200 A Rear-Connected Offset Vertical (RCOV)

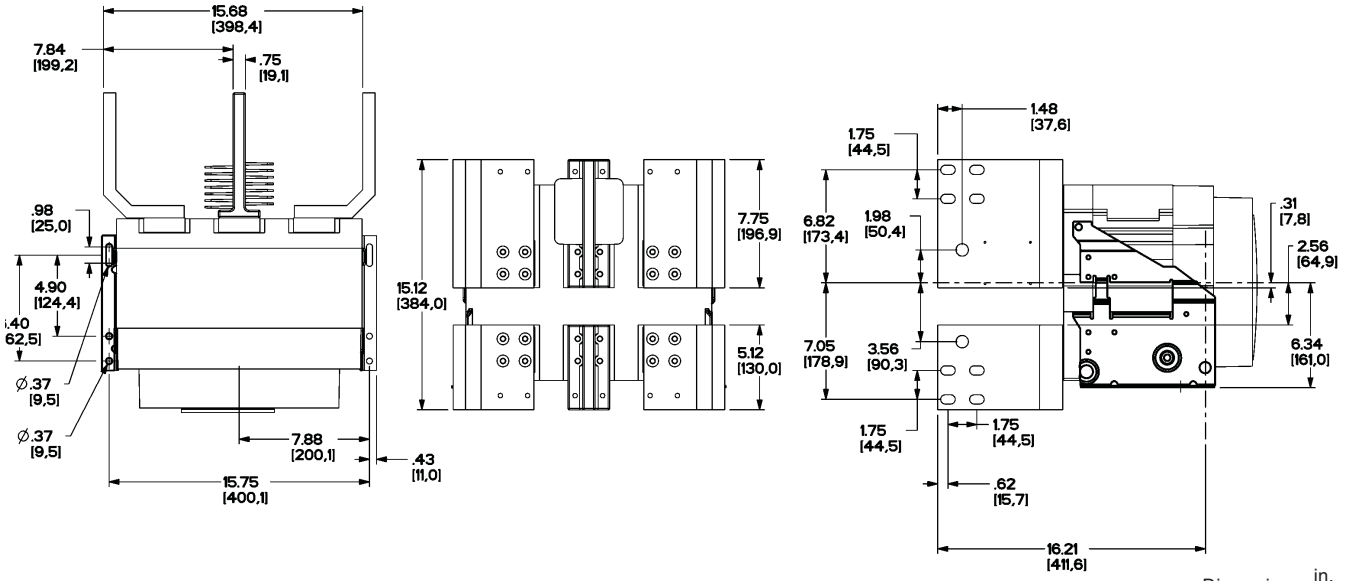

Figure 94: 4000 A (W-Frame) Rear-Connected Offset Vertical (RCOV)

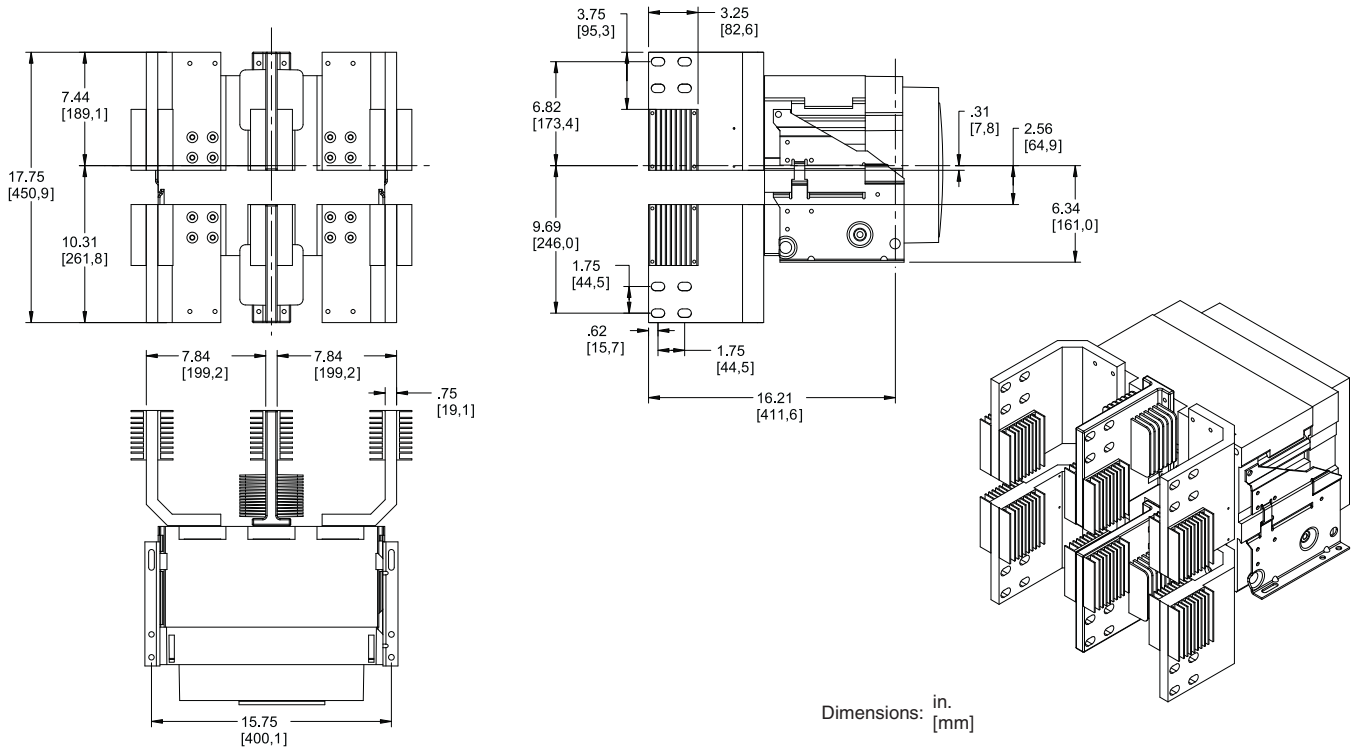

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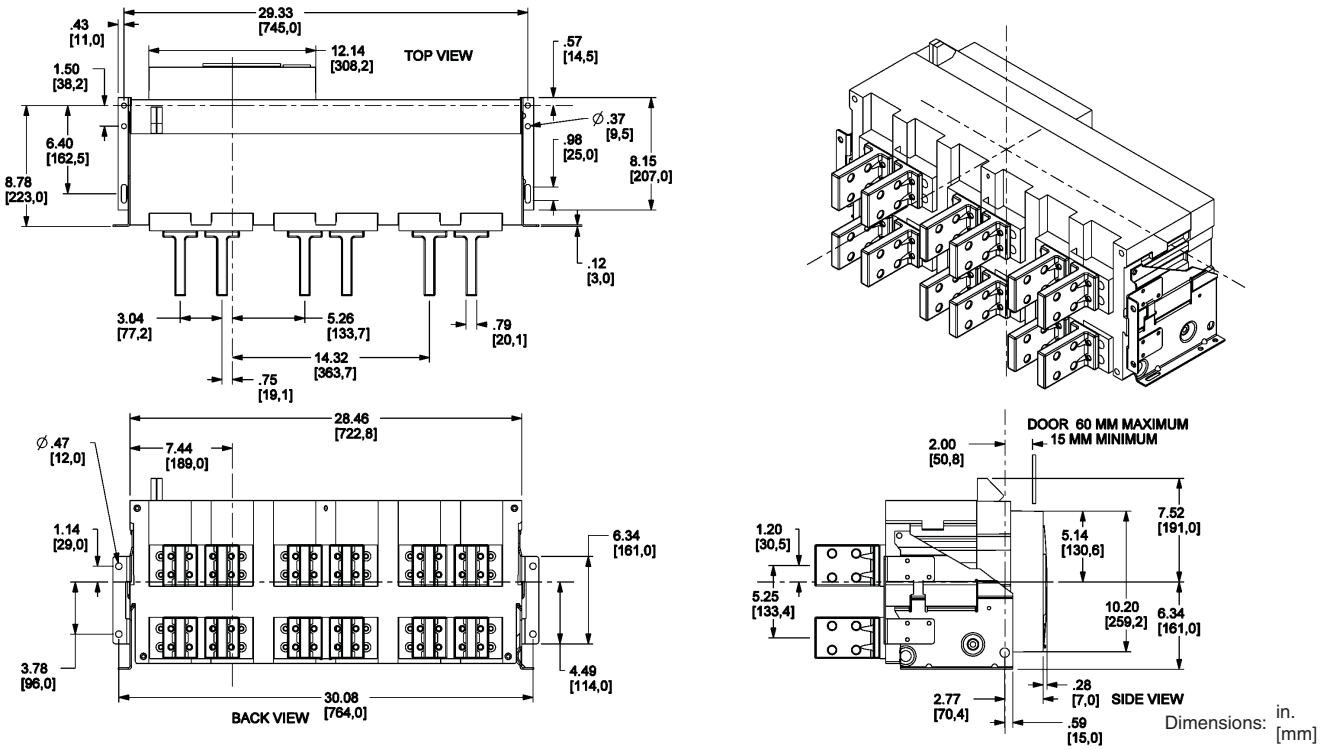
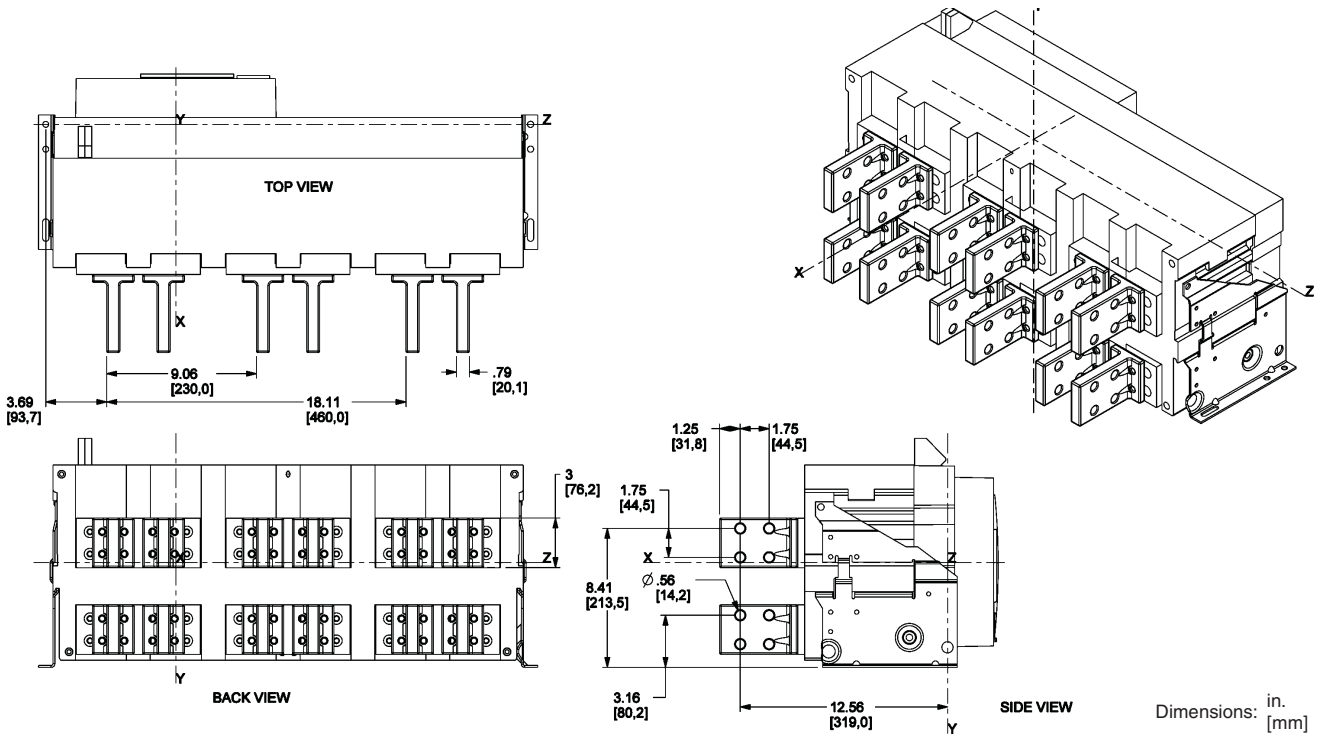
Figure 95: 4000–6000 A Master Drawing



Dimensions: in. [mm]

Figure 96: 4000–5000 A Rear-Connected "T" Vertical (RCTV)



Dimensions: in. [mm]

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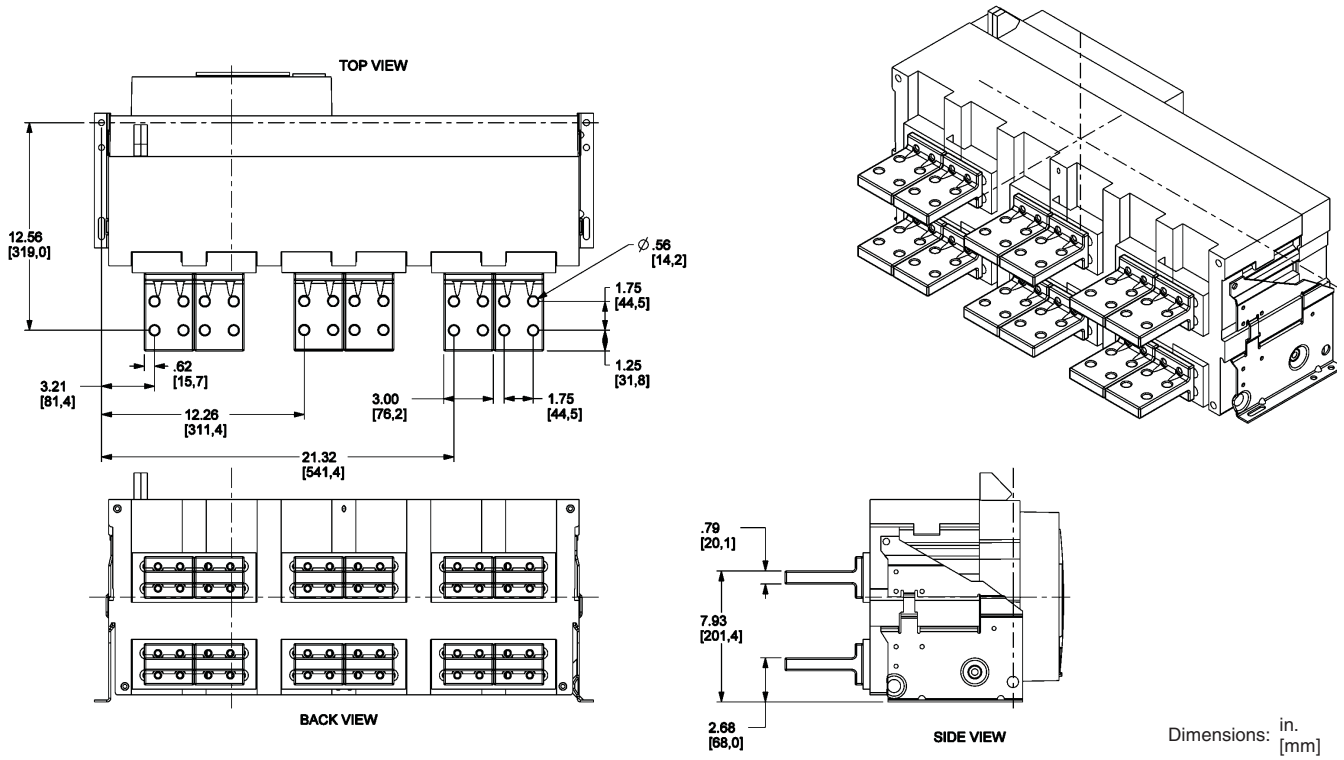
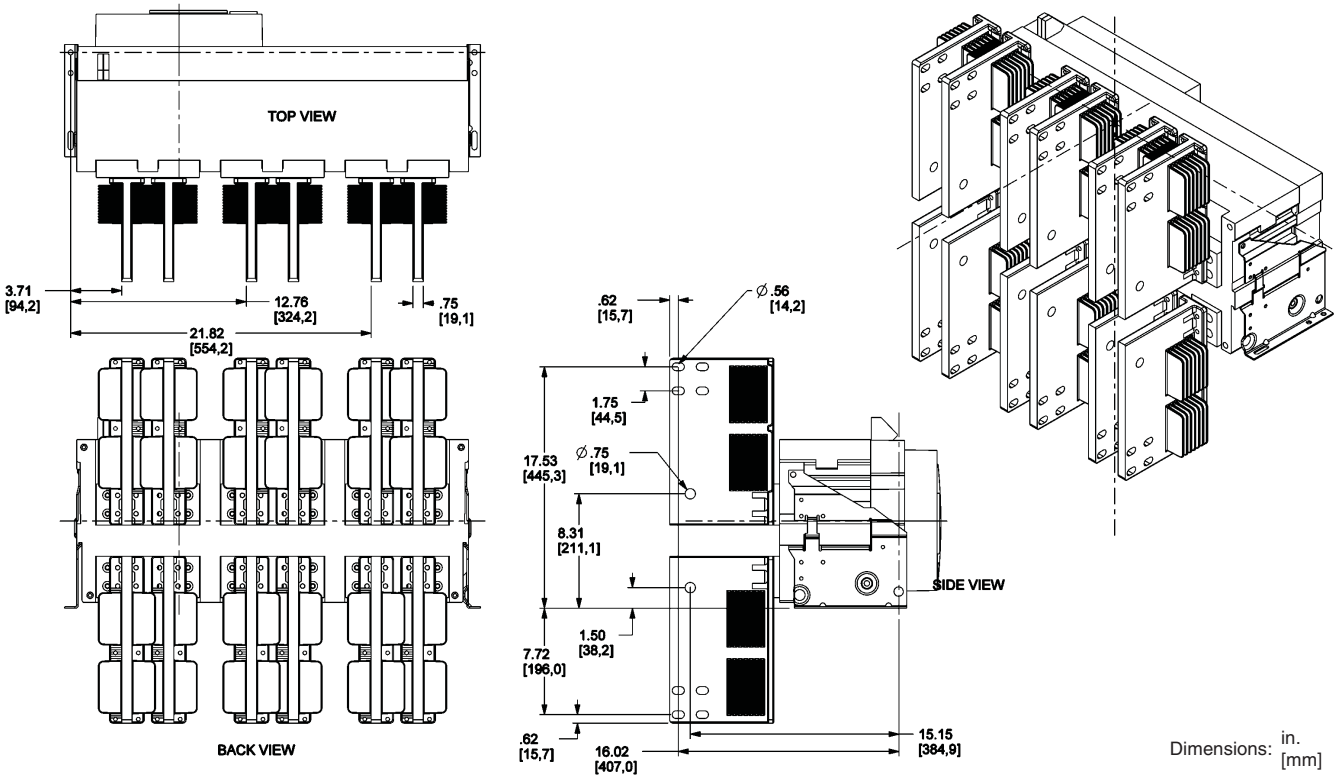
Figure 97: 4000–5000 A Rear-Connected "T" Horizontal (RCTH)



Dimensions: in. [mm]

Figure 98: 6000 A Rear-Connected "T" Vertical (RCTV)



Dimensions: in. [mm]

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Figure 99: 800–3200 A and 4000 A (W-Frame) Circuit Breaker Door Cutout

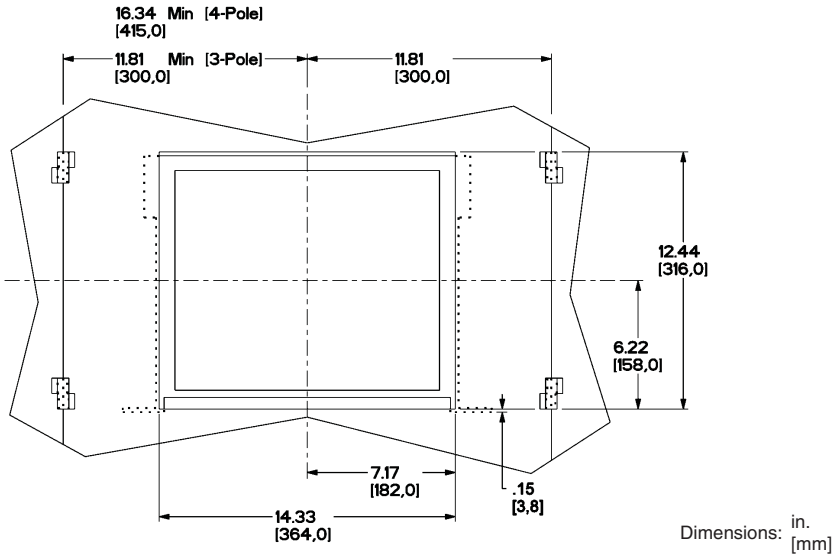
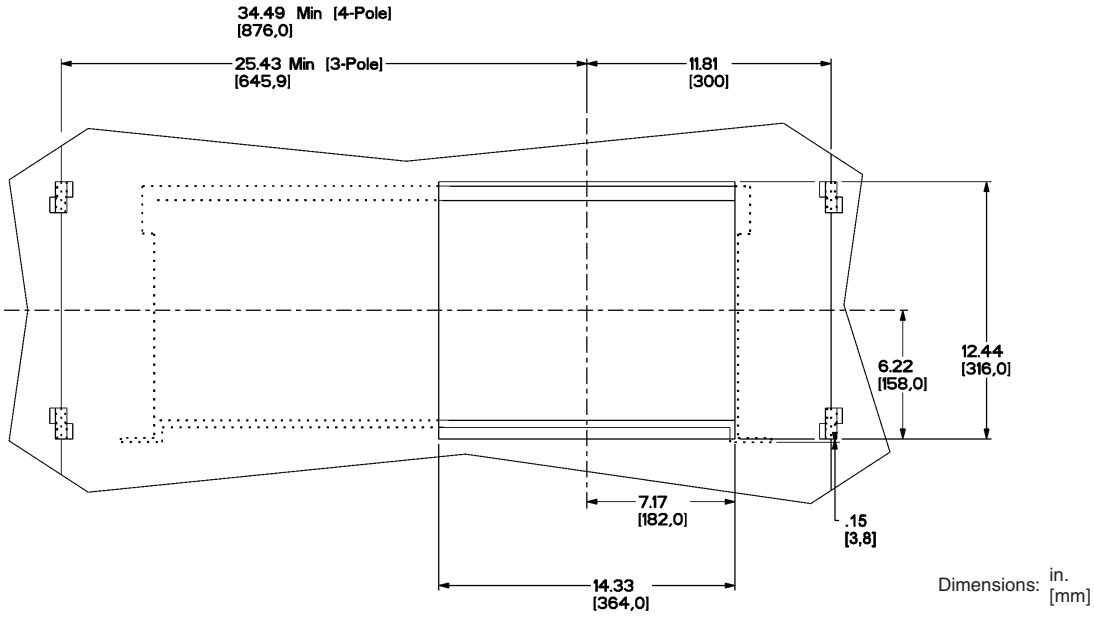


Figure 100: 4000–6000 A Door Cutout



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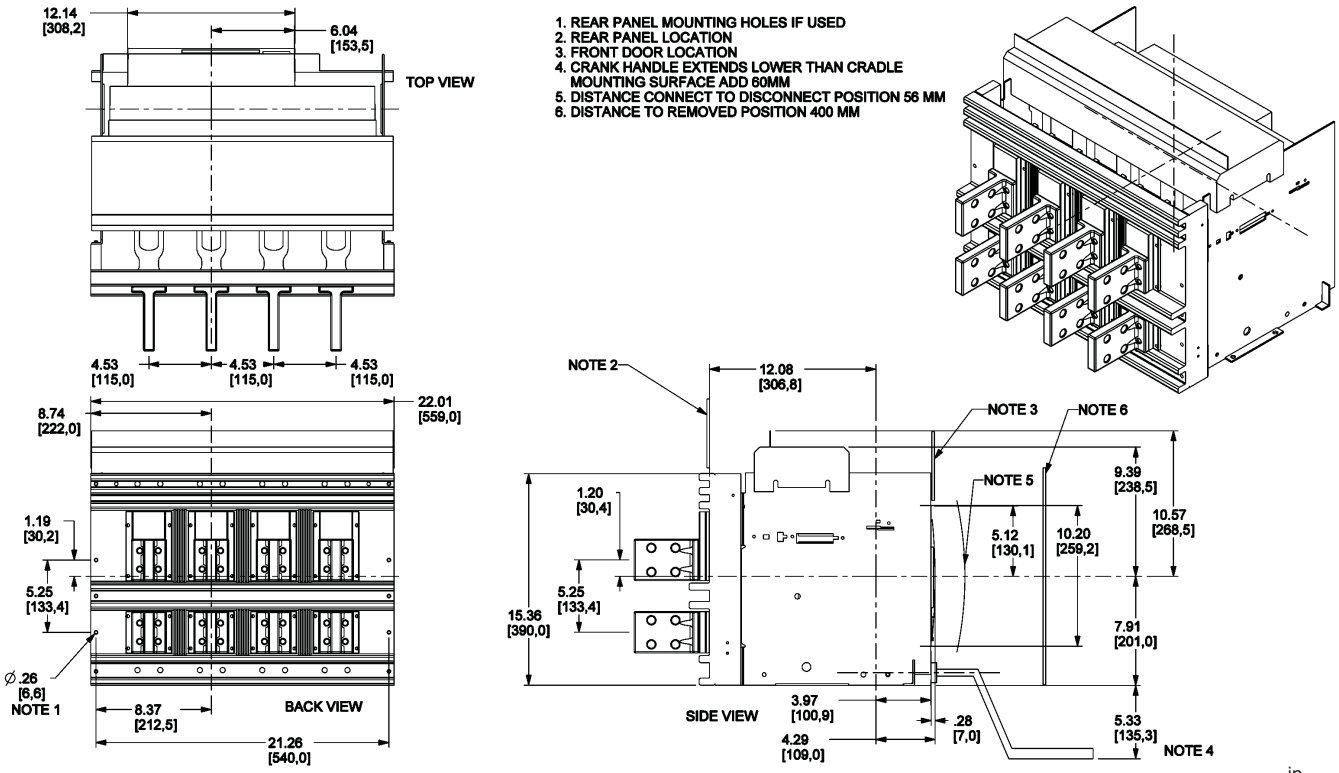
UL/ANSI 4P Drawout Circuit Breakers

Figure 101: 800–3000 A and 3200 A Master Drawing



Dimensions: in. [mm]

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Figure 102: 800–2000 A Rear-Connected "T" Vertical (RCTV)

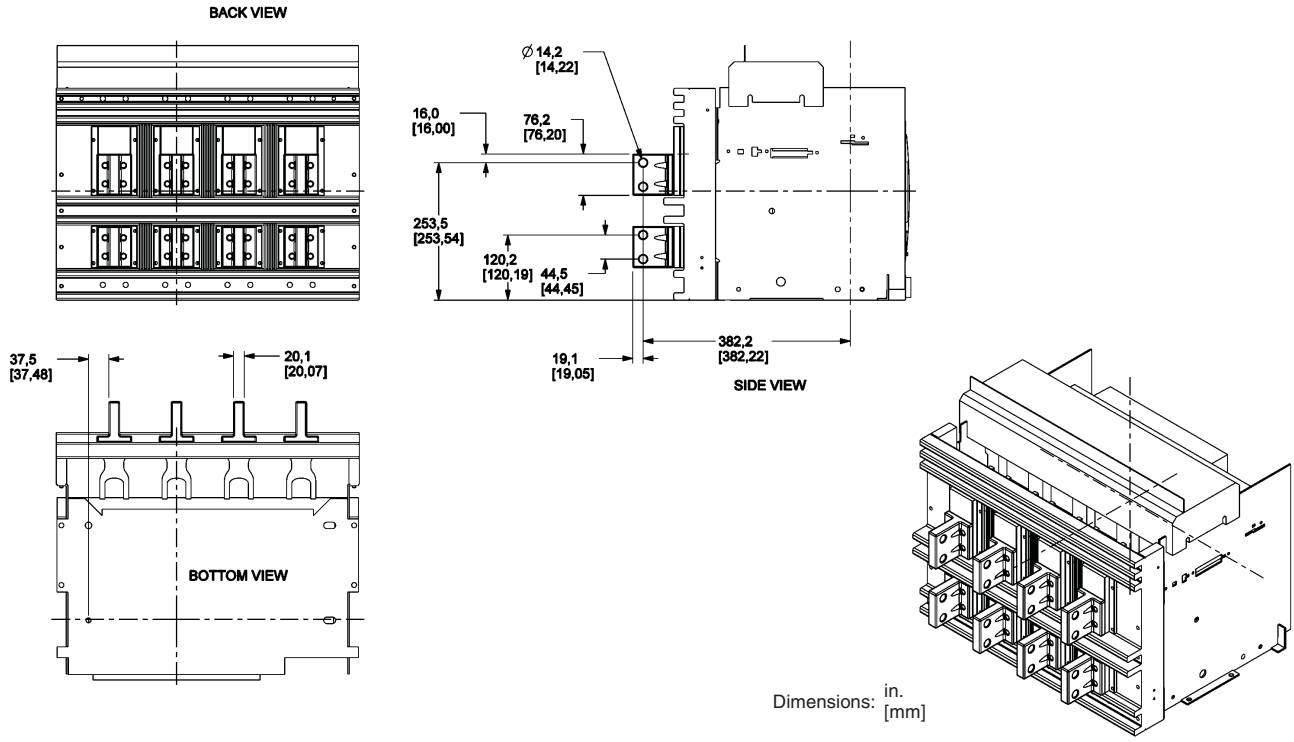

Figure 103: 800–2000 A Rear-Connected "T" Horizontal (RCTH)

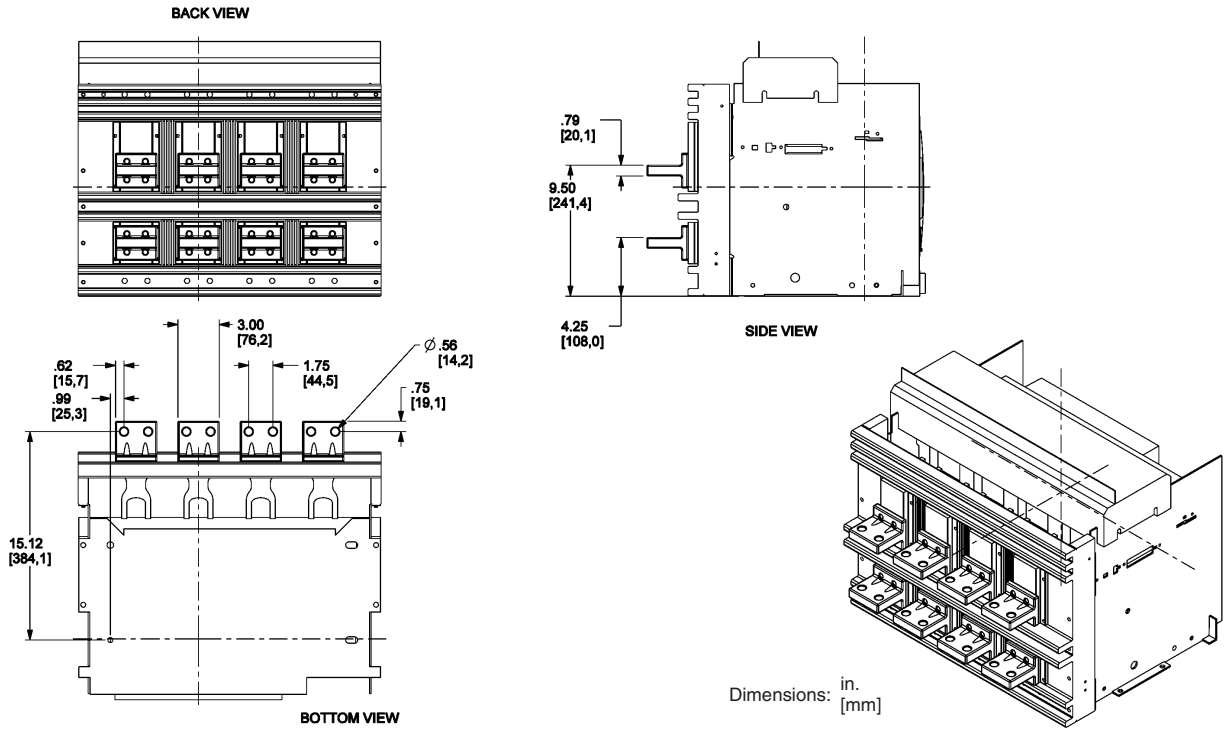

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Figure 104: 800–2000 A Front-Connected Flat (FCF)

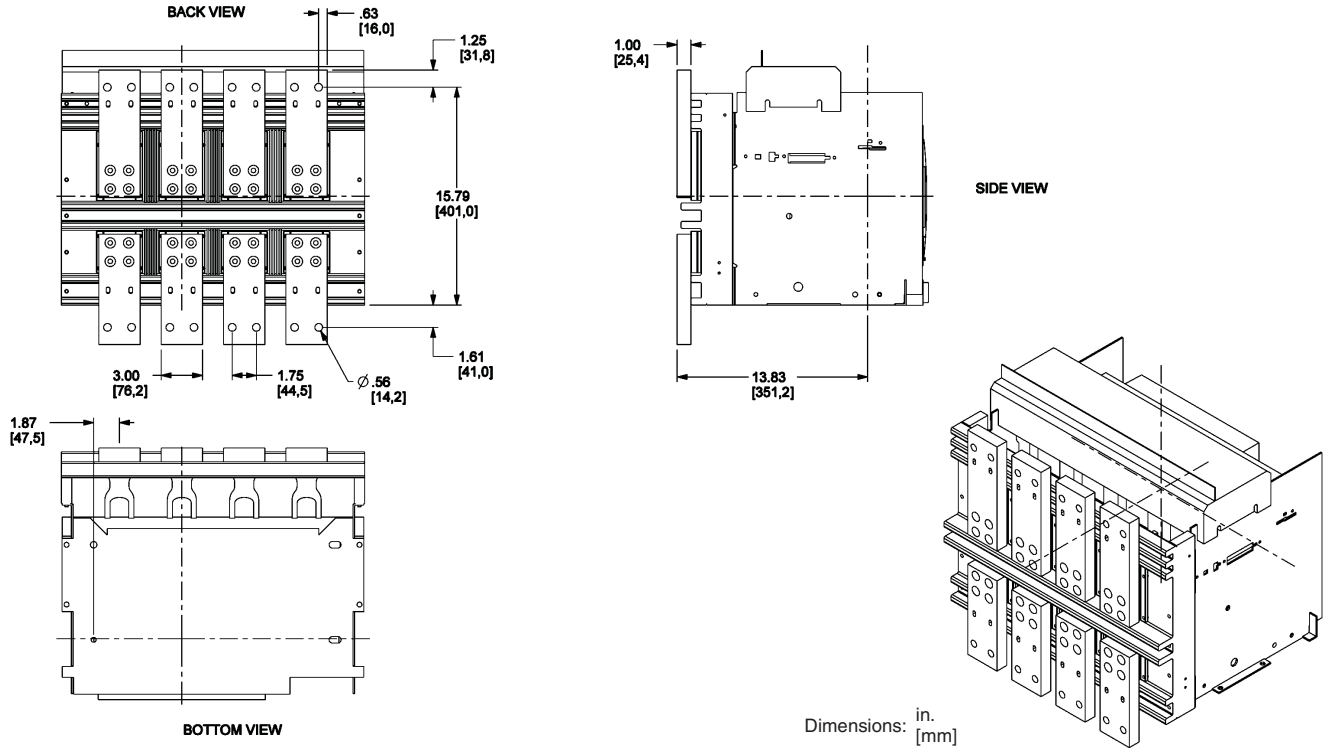

Figure 105: 800–3000 A Front-Connected "T" (FCT)

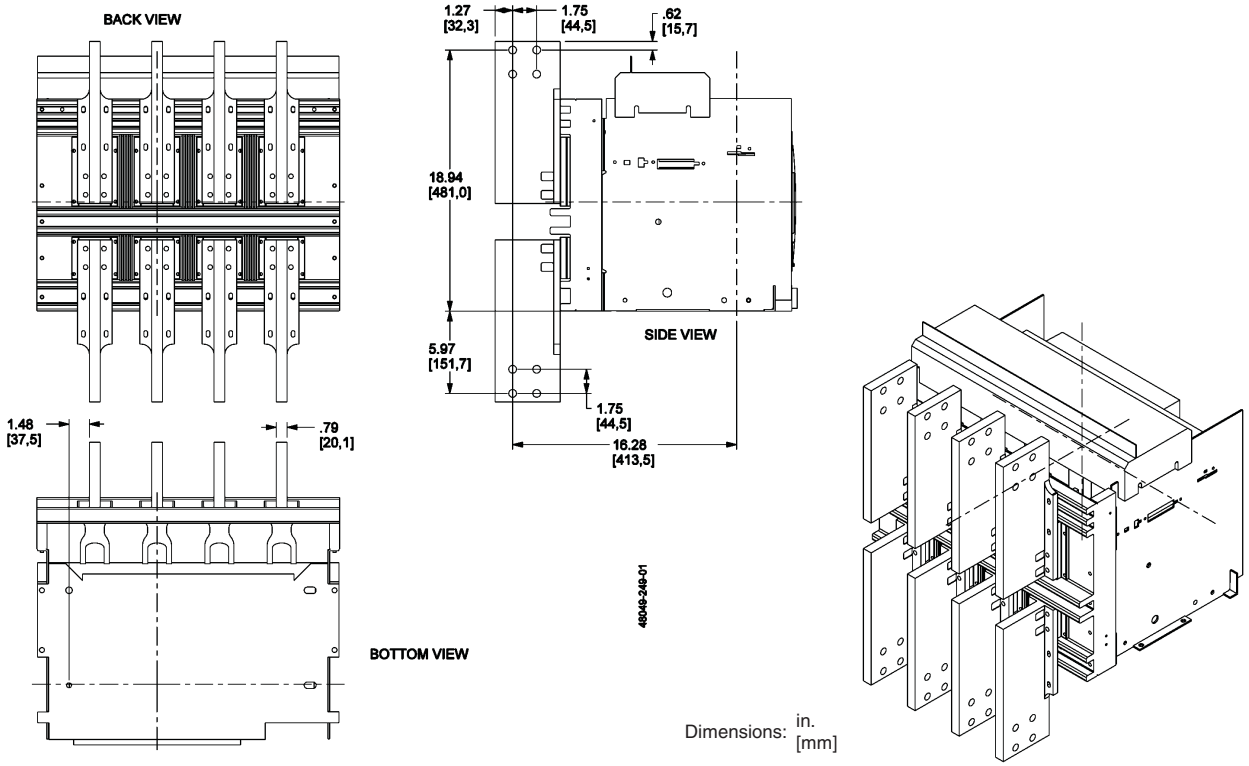

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Figure 106: 2500–3000 A Rear-Connected "T" Vertical (RCTV)

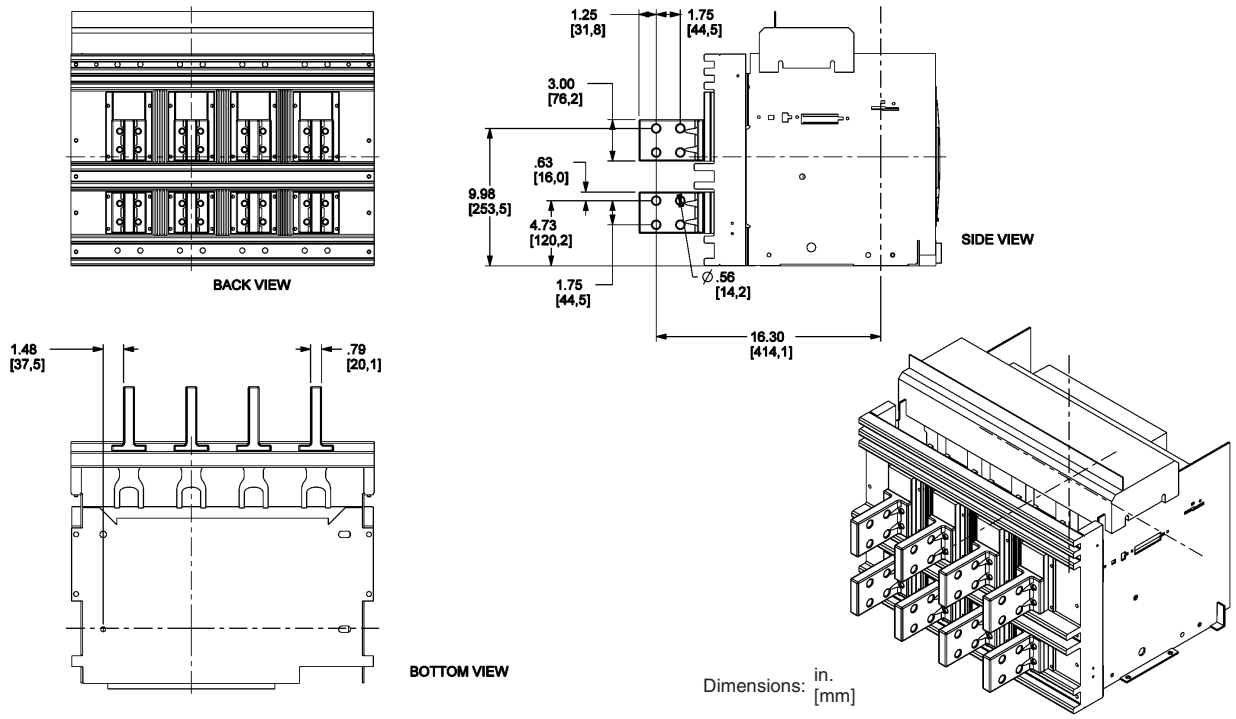

Figure 107: 2500–3000 A Rear-Connected "T" Horizontal (RCTH)

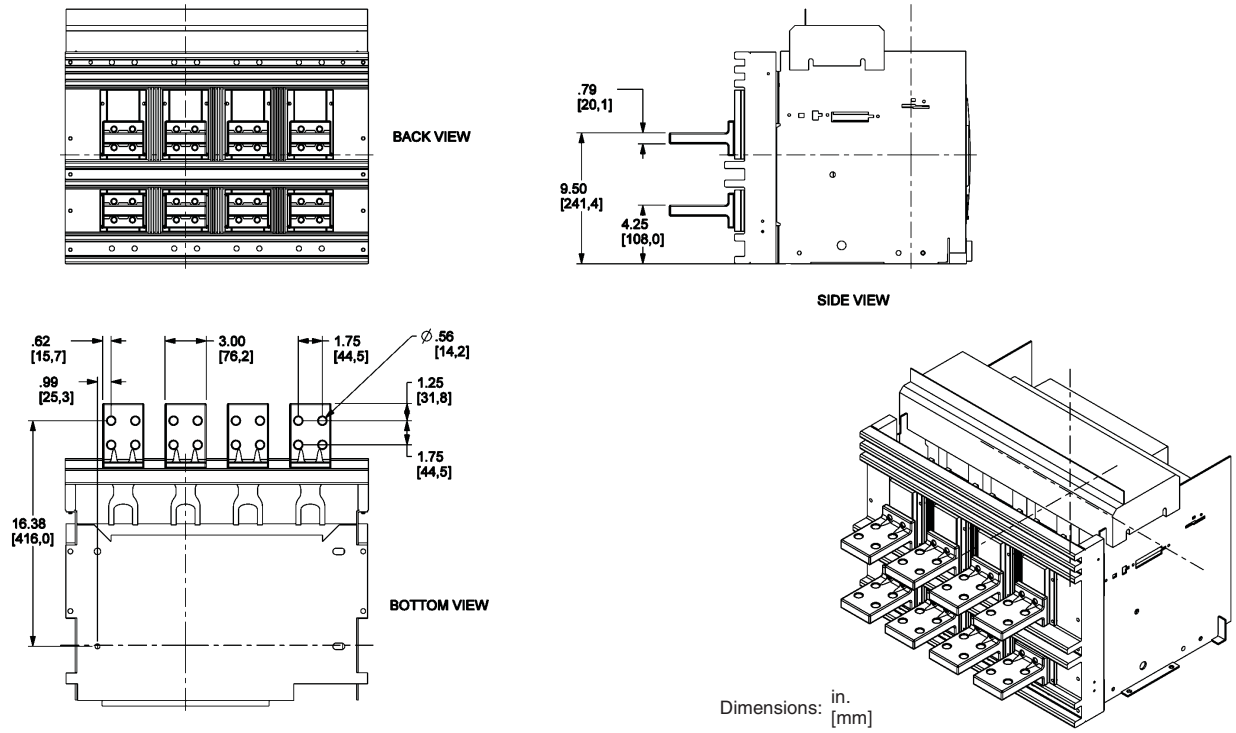

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Figure 108: 2000 A L1 and 3200 A Rear-Connected Offset Vertical (RCOV)

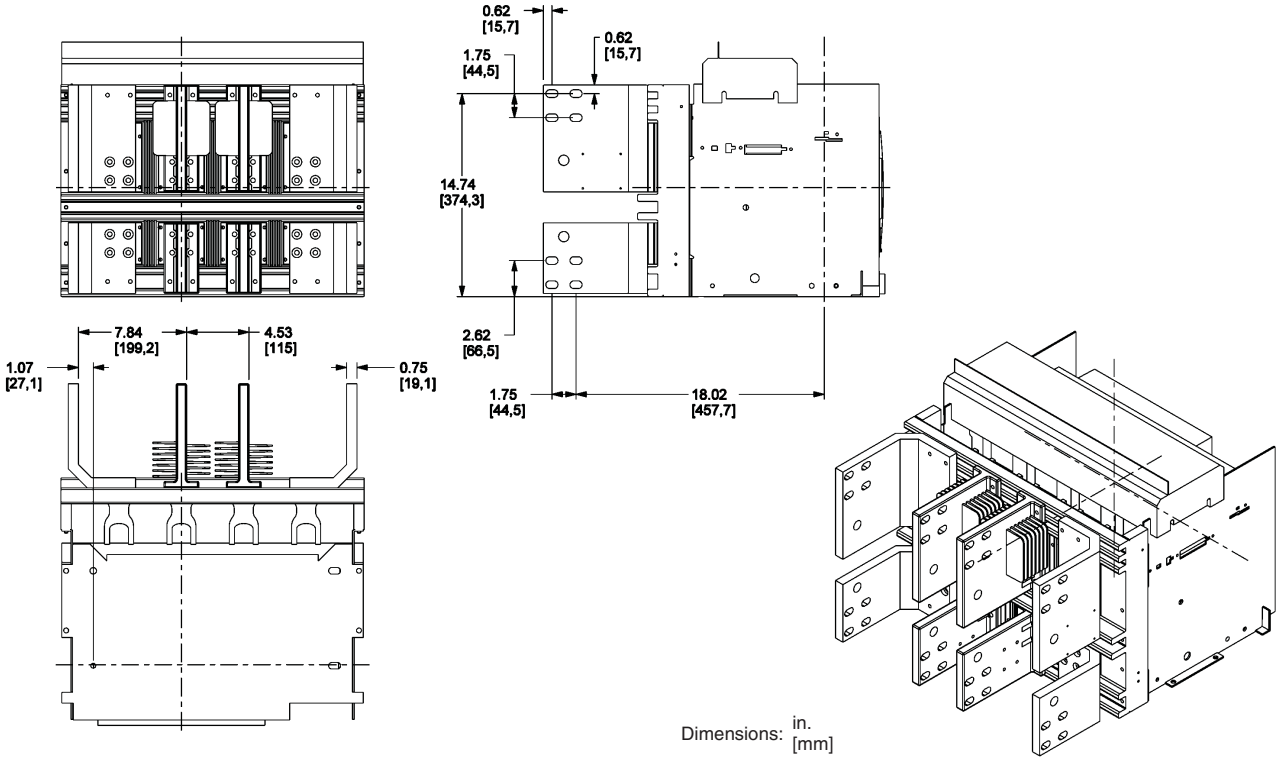

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Figure 109: 3200 A L1 and 4000–6000 A Master Drawing

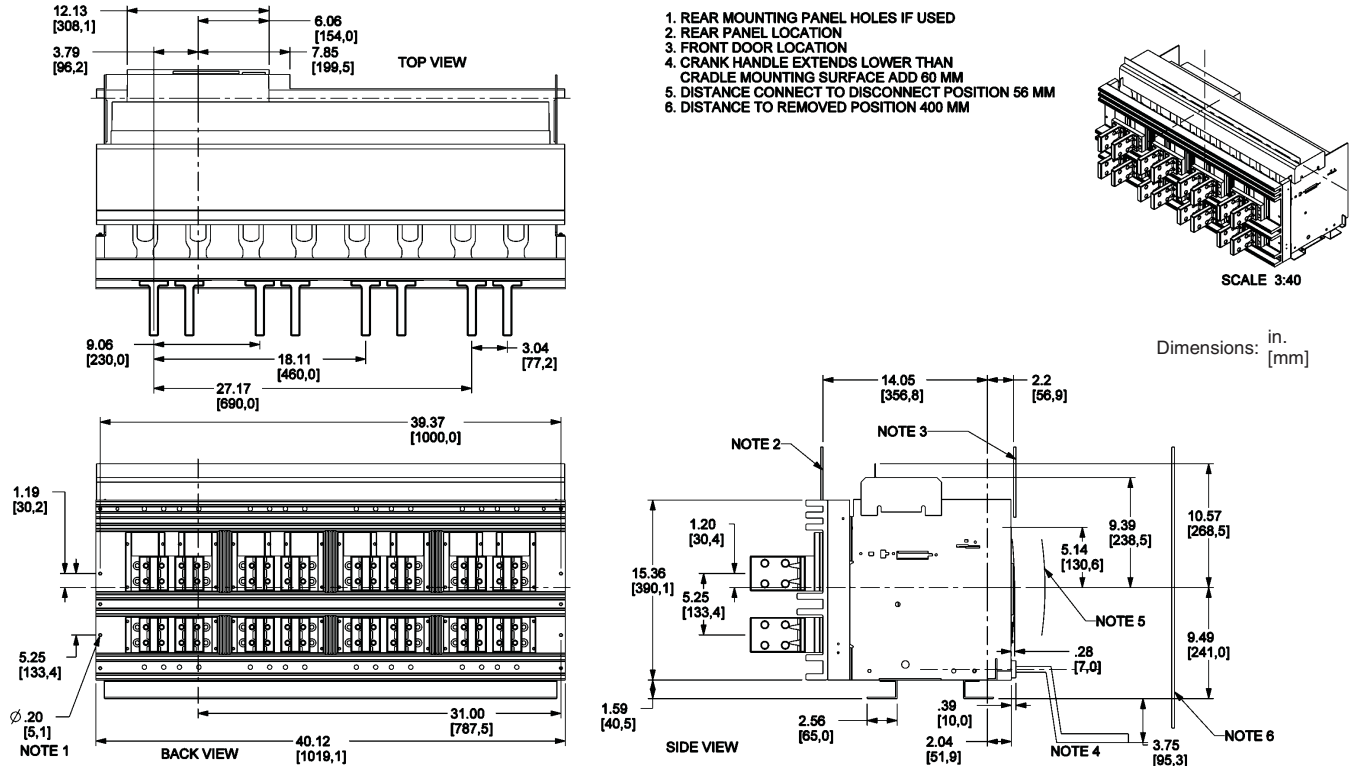

Figure 110: 3200 A L1 and 4000–5000 A Rear-Connected "T" Vertical (RCTV)

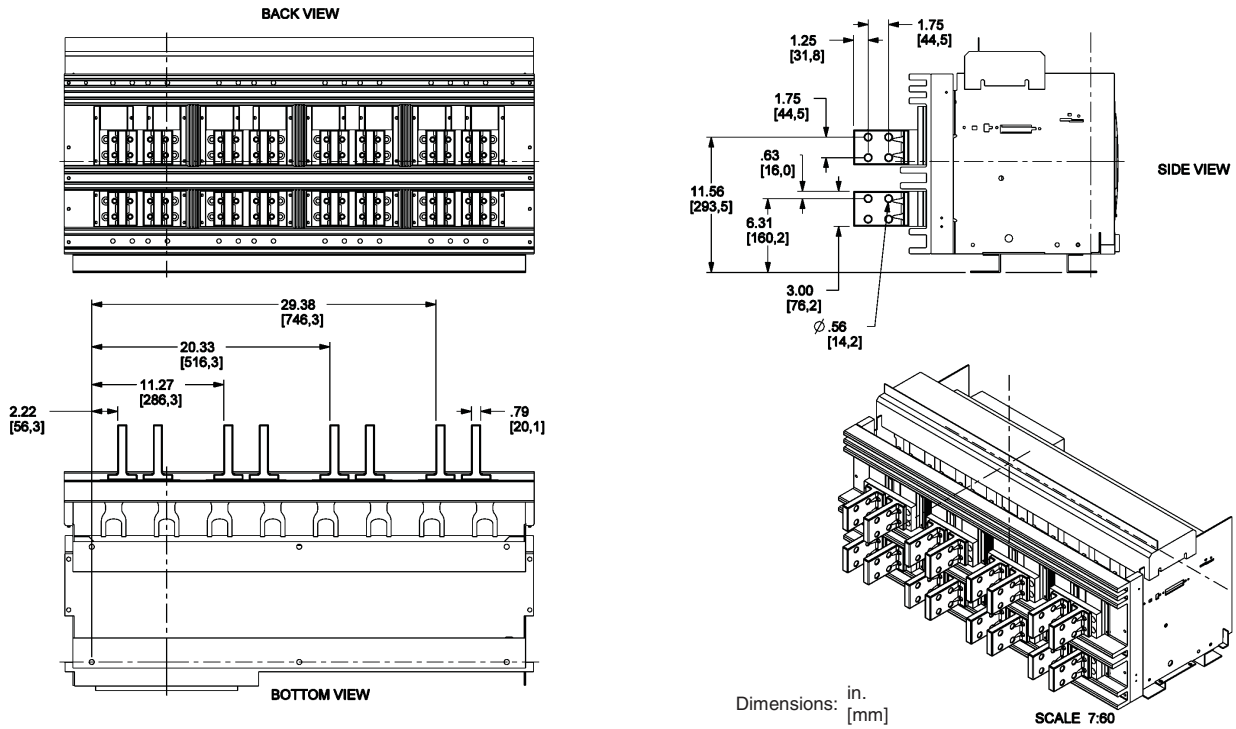

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Figure 111: 3200 A L1 and 4000–5000 A Rear-Connected "T" Horizontal (RCTH)

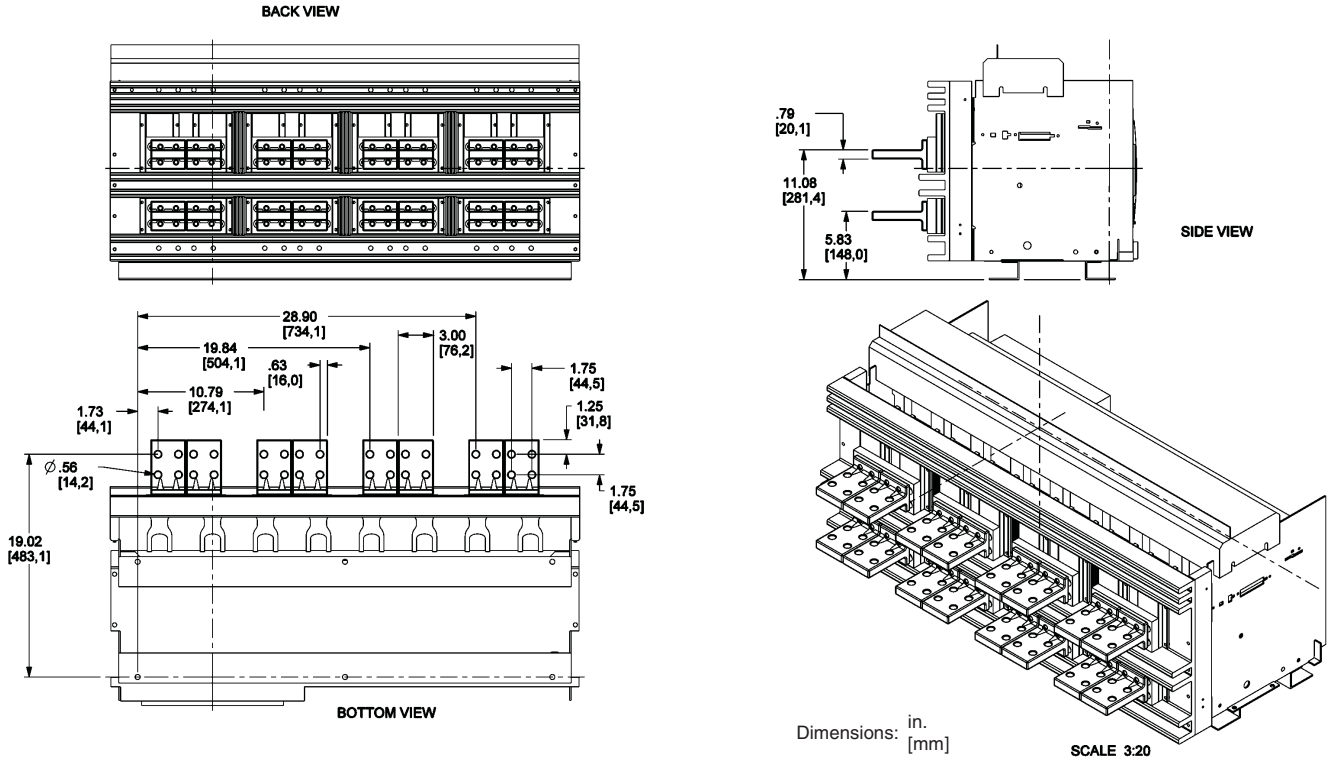

Figure 112: 3200 A L1 and 4000 A Front-Connected Flat (FCF)

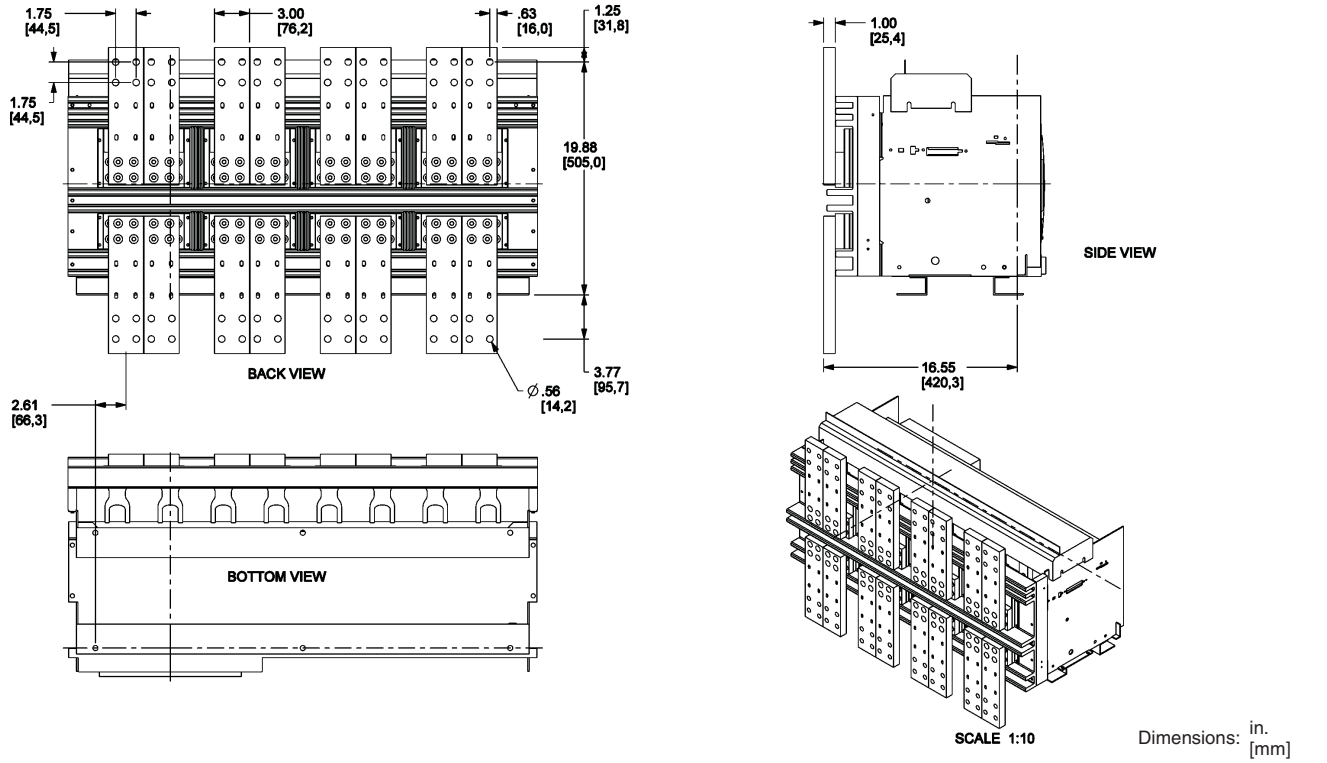

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Figure 113: 3200 A L1 and 4000–5000 A Front-Connected "T" (FCT)

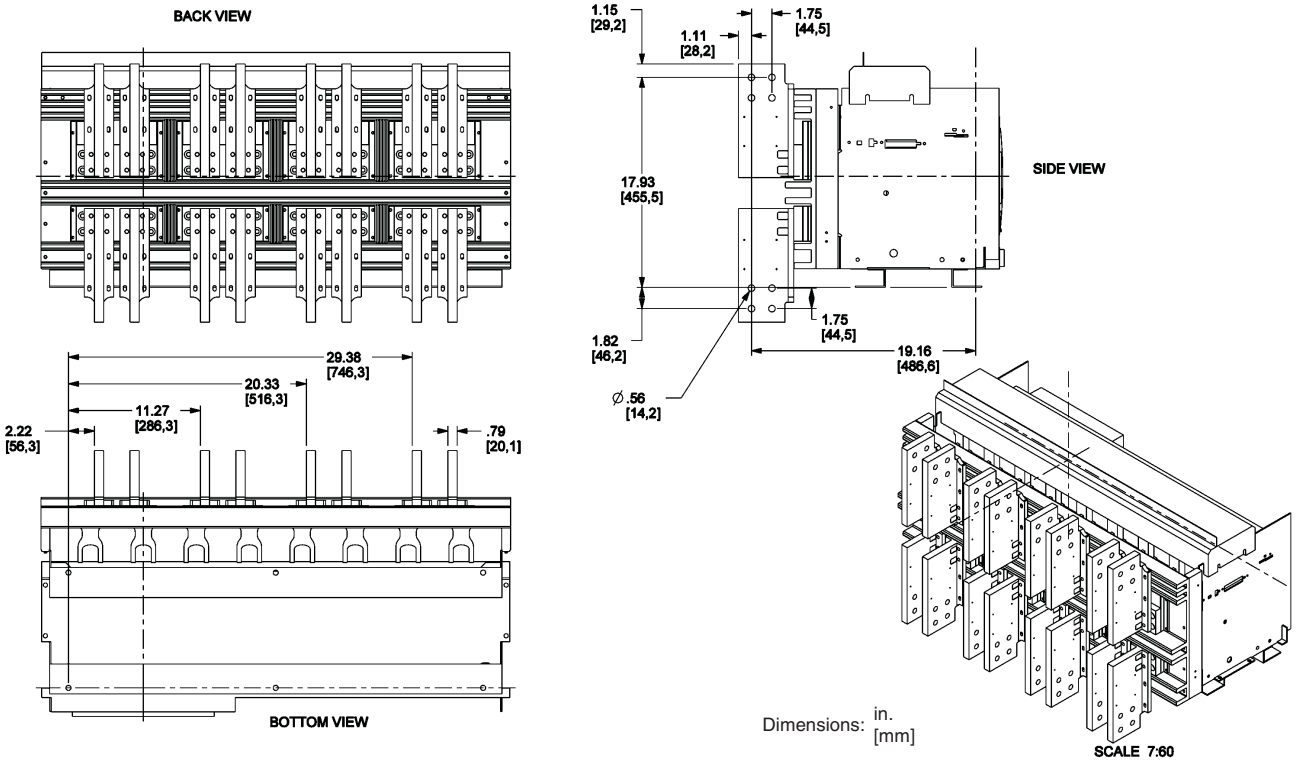
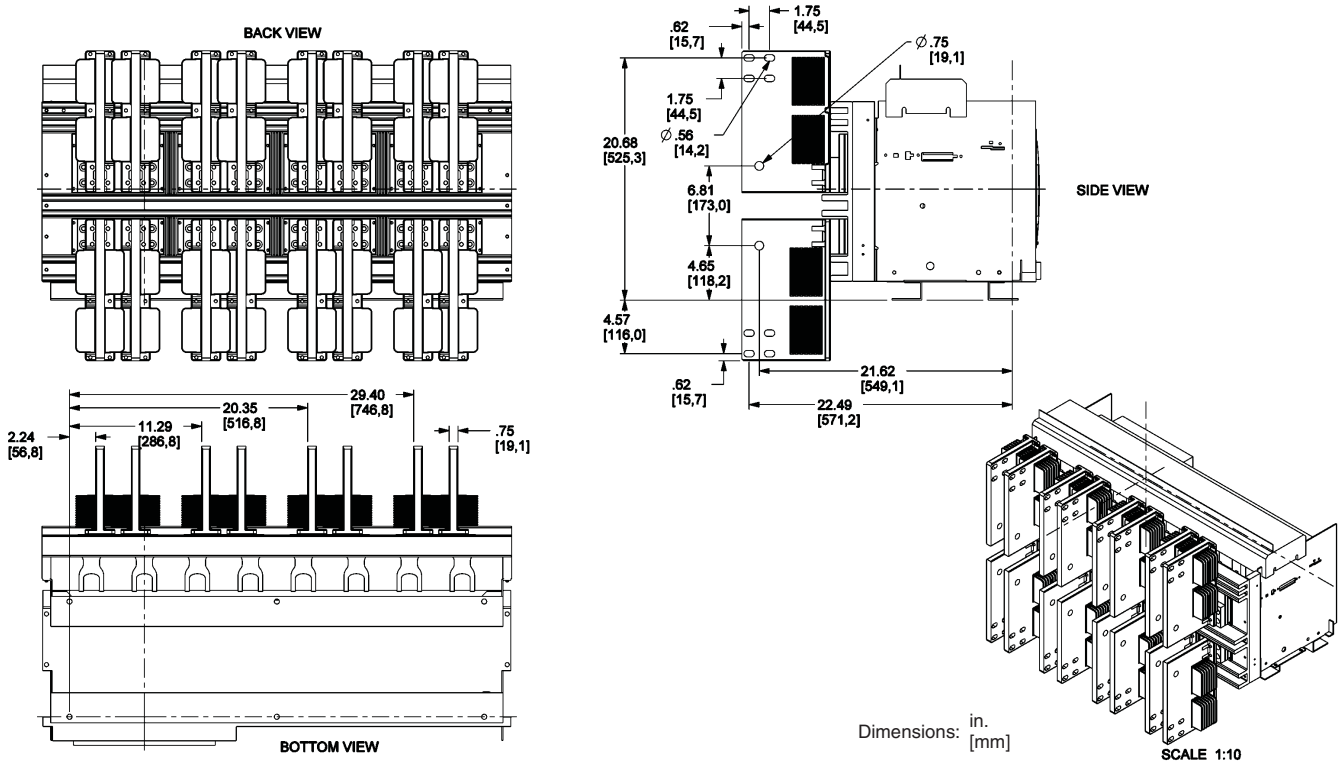


Figure 114: 6000 A Rear-Connected "T" Vertical (RCTV)



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UL/ANSI 4P Fixed Circuit Breakers

Figure 115: 800–3000 A, 3200 A and 4000 A (W-Frame) Master Drawing

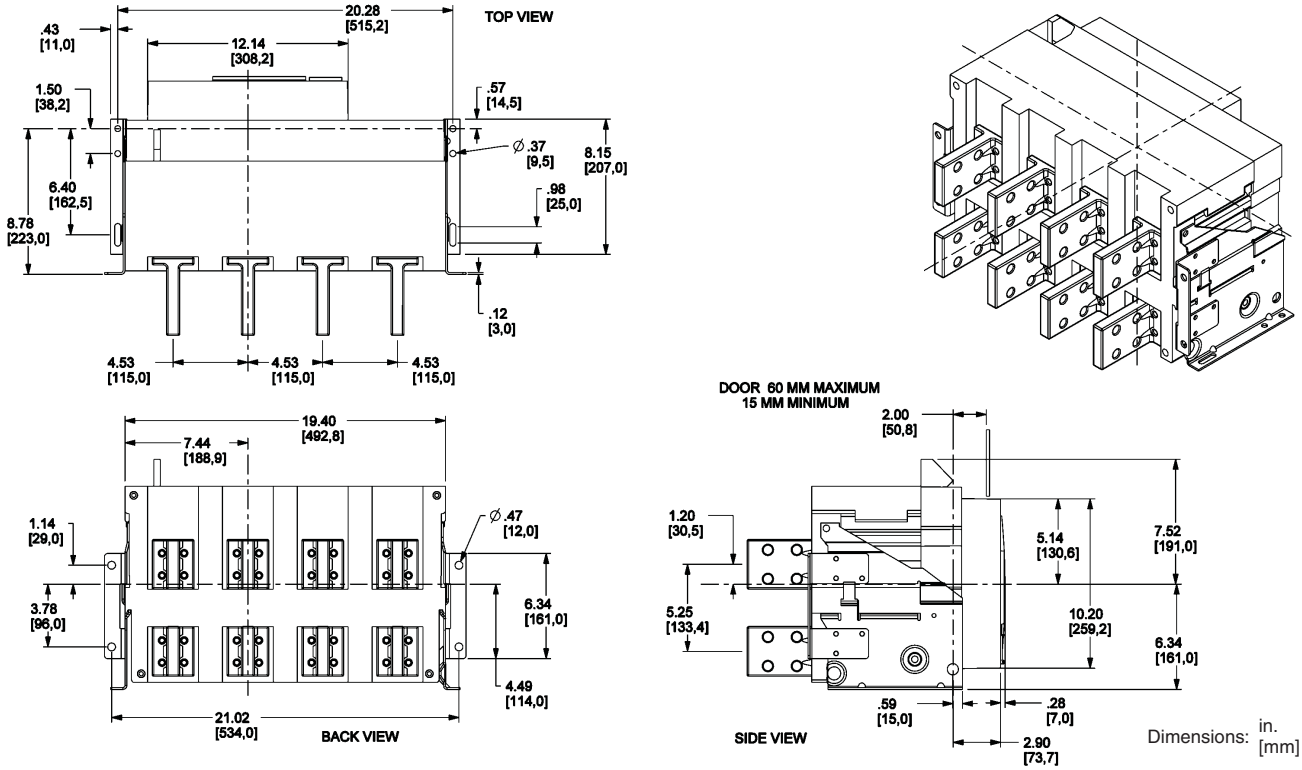

Figure 116: 800–2000 A Rear-Connected "T" Vertical (RCTV)

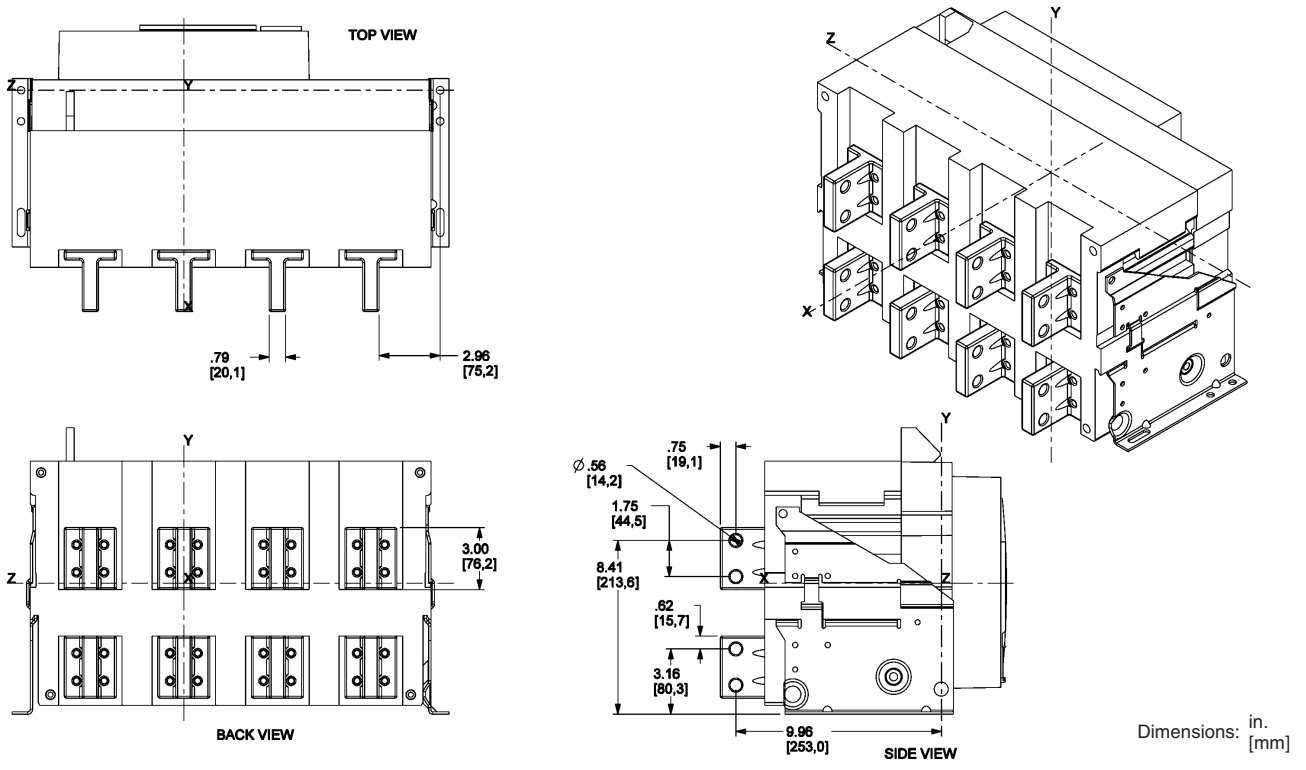

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Figure 117: 800–2000 A Rear-Connected "T" Horizontal (RCTH)

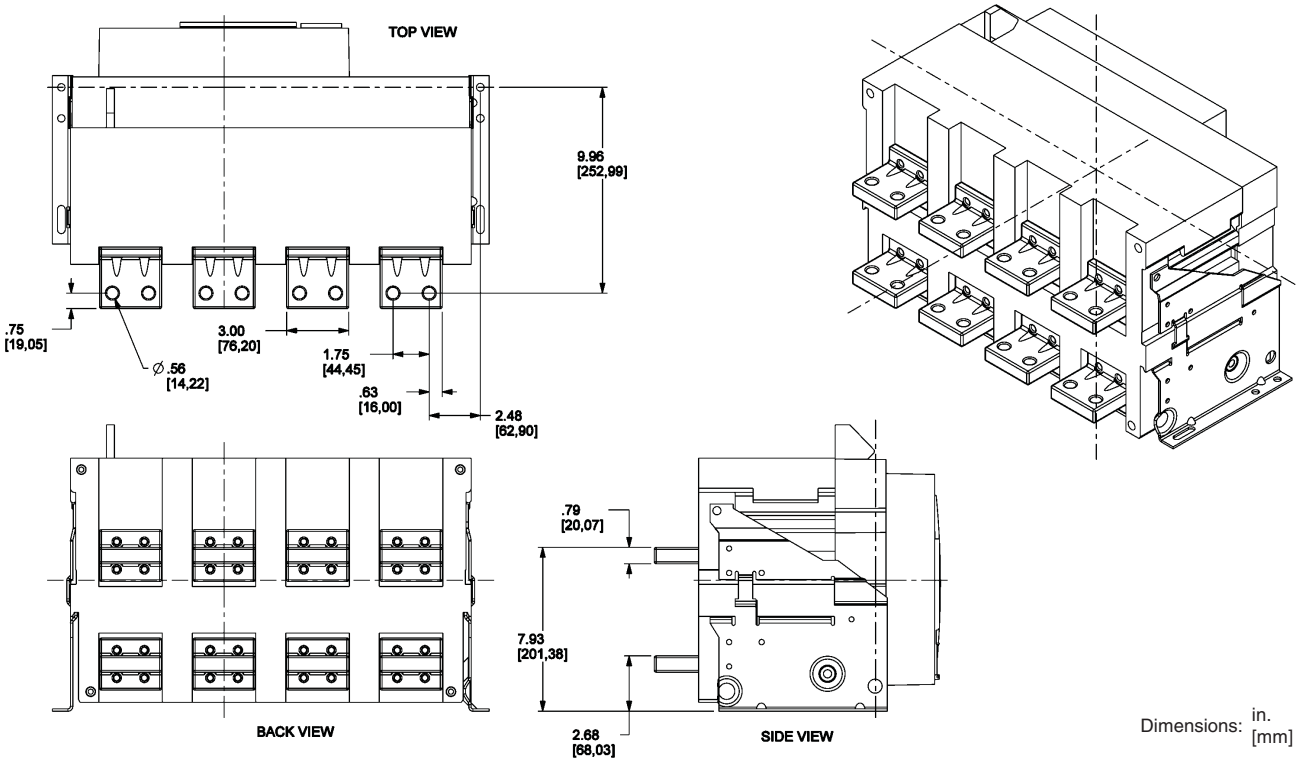

Figure 118: 800–2000 A Front-Connected Flat (FCF)

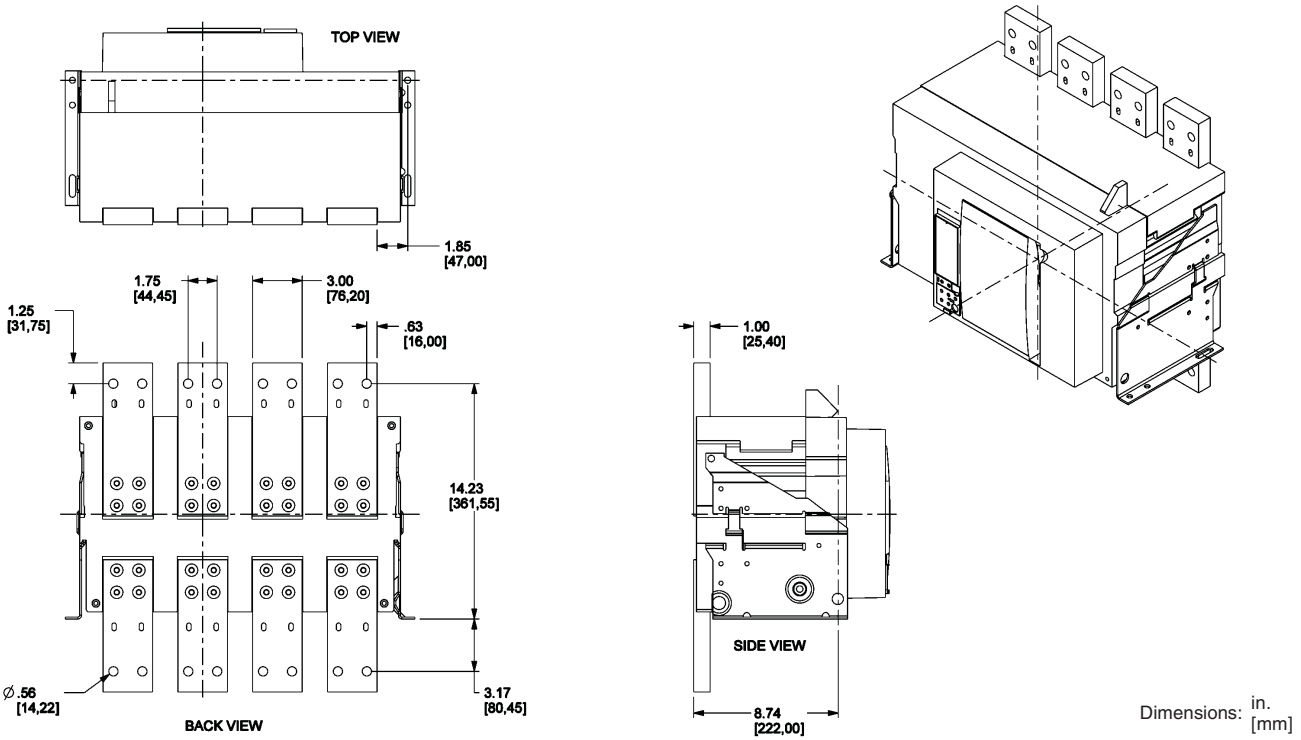

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Figure 119: 800–3000 A Front-Connected "T" (FCT)

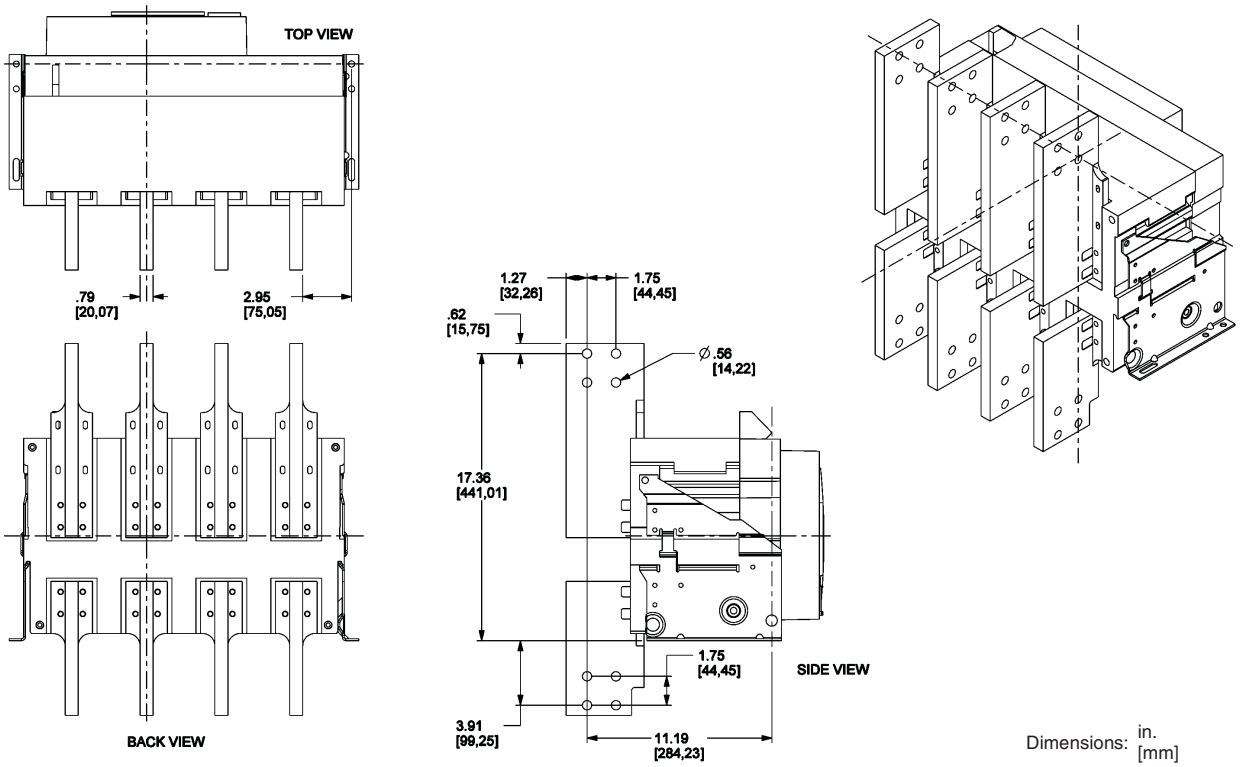

Figure 120: 2000 A L1 and 3200 A Rear-Connected Offset Vertical (RCOV)

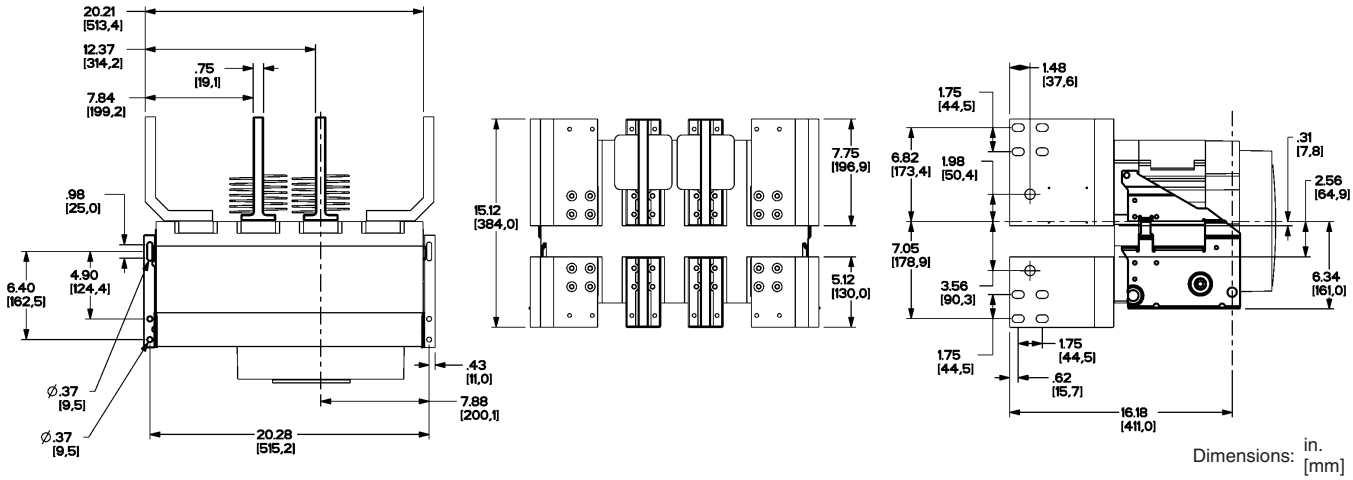

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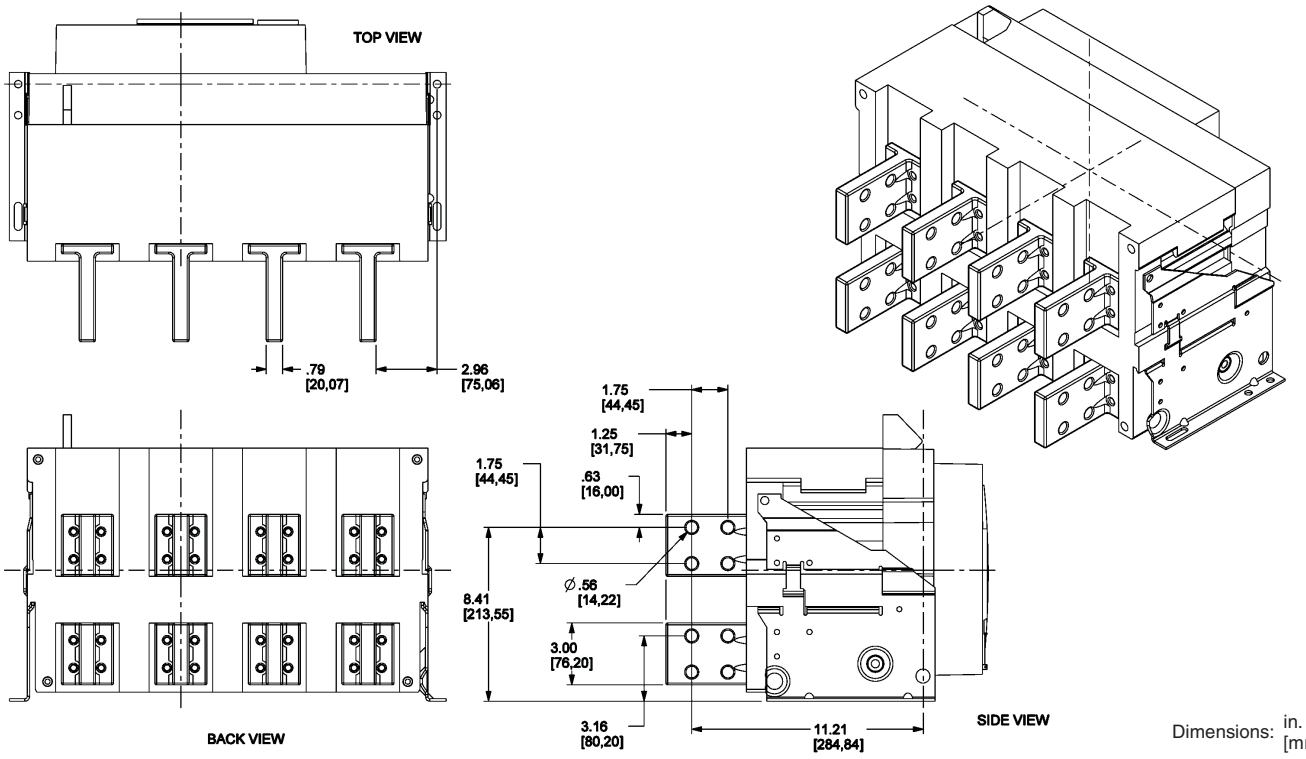
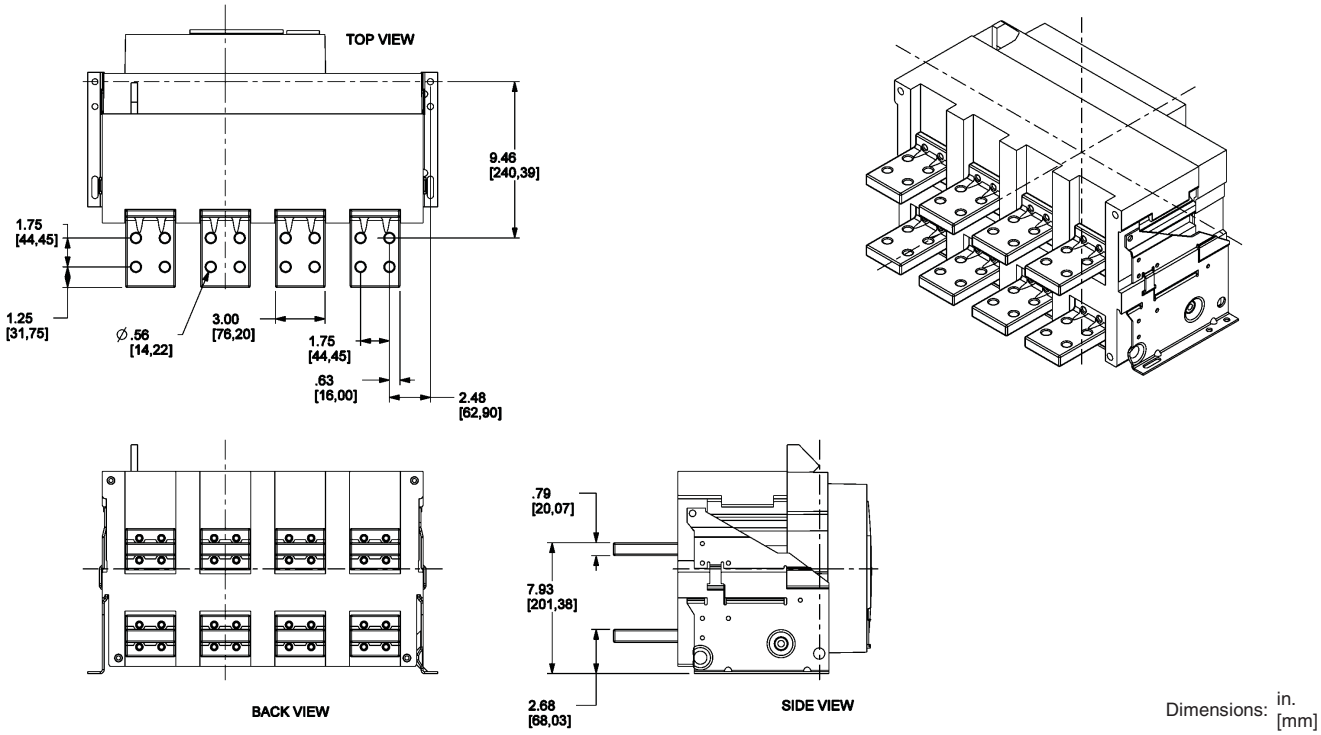
Figure 121: 2500–3000 A Rear Vertical "T" Horizontal (RCTV)



Dimensions: in. [mm]

Figure 122: 2500–3000 A Rear-Connected "T" Horizontal (RCTH)



Dimensions: in. [mm]

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Figure 123: 4000–6000 A Master Drawing

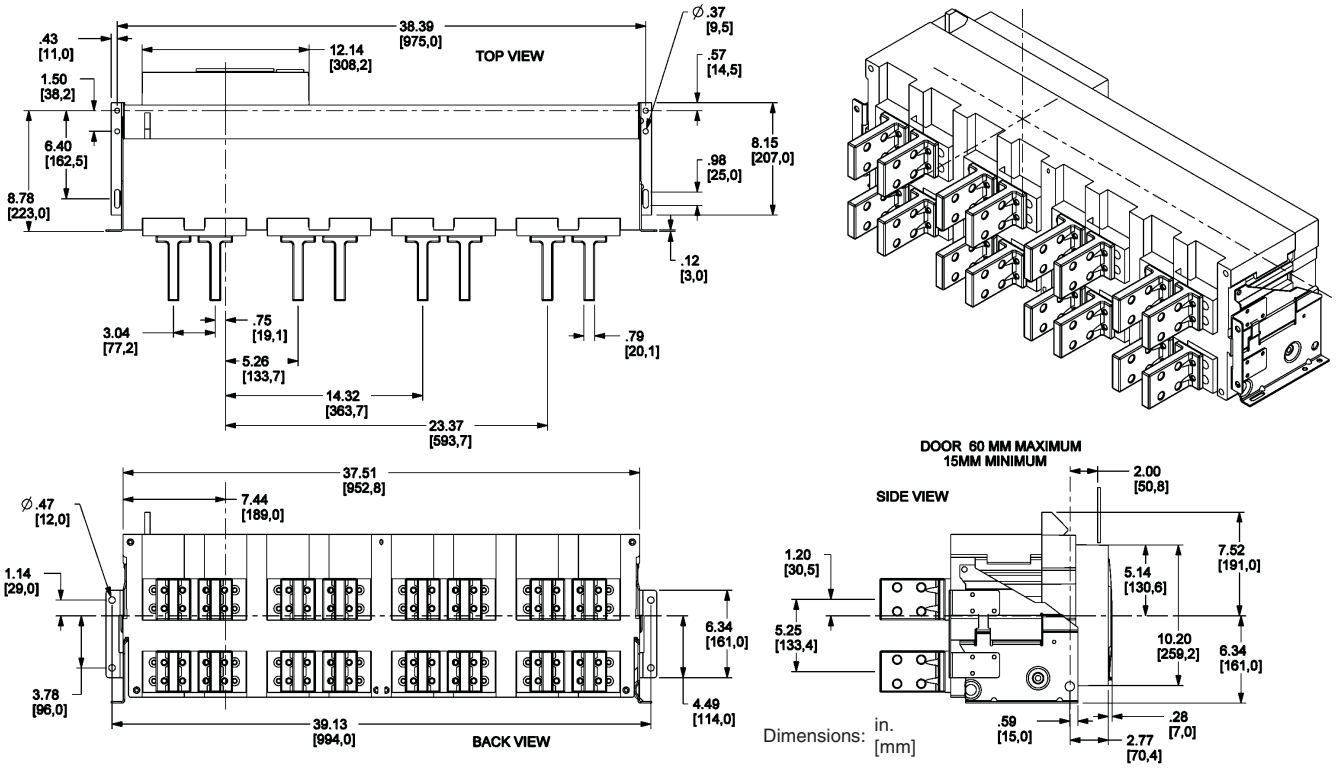

Figure 124: 4000–5000 A Rear-Connected "T" Vertical (RCTV)

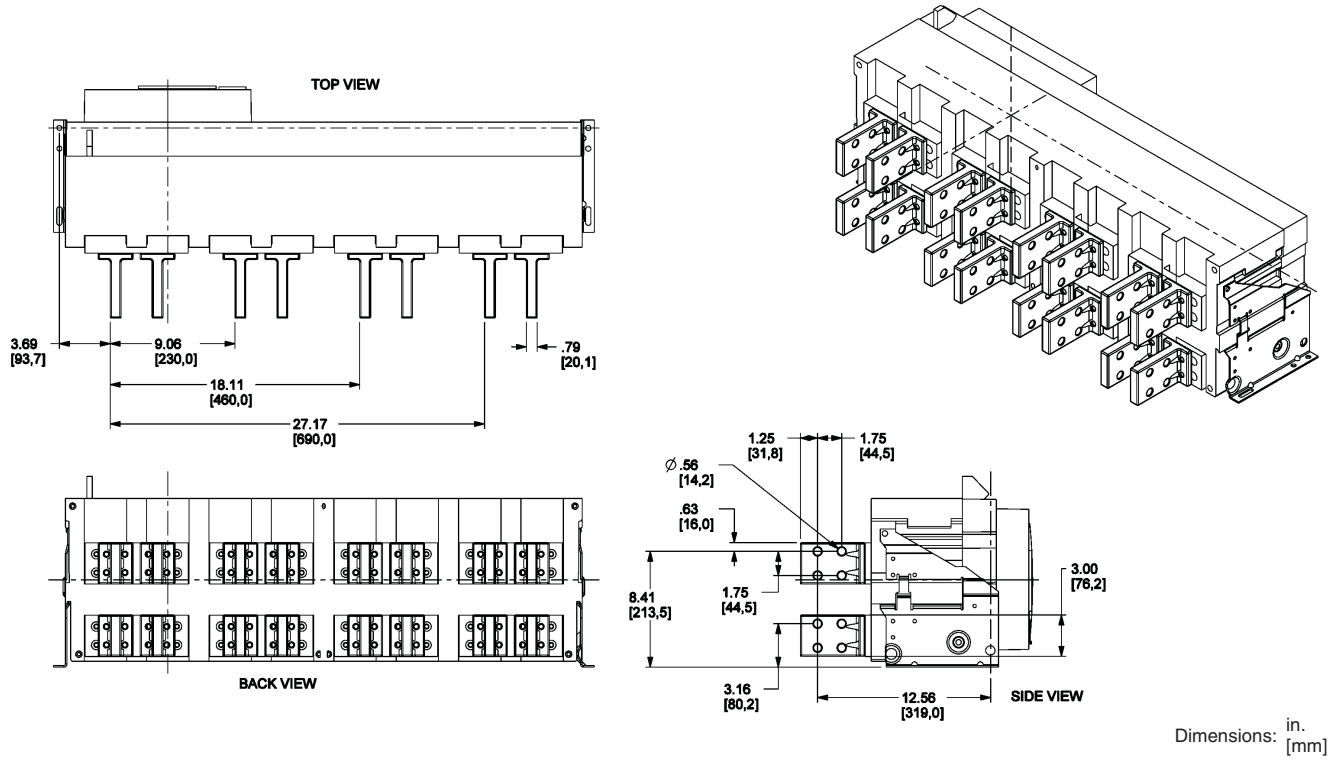

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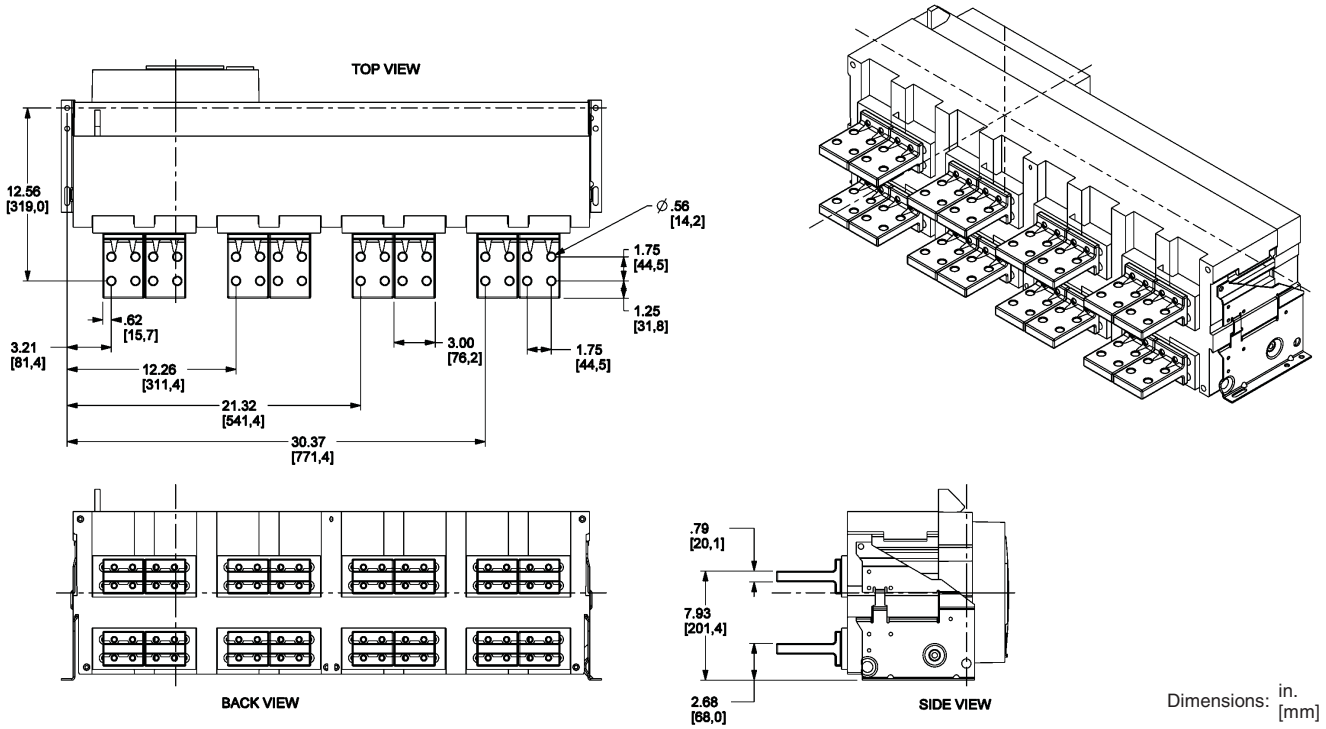
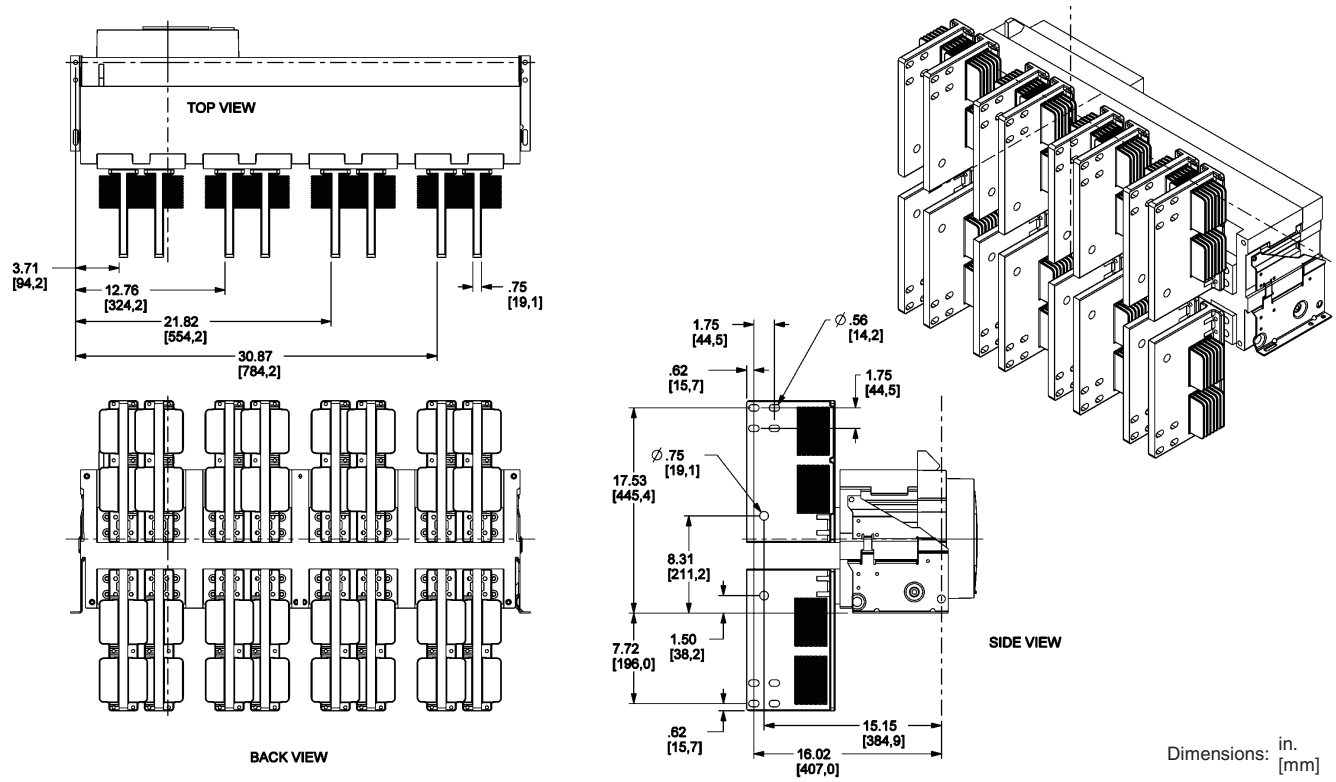
Figure 125: 4000–5000 A Rear-Connected "T" Horizontal (RCTH)



Dimensions: in. [mm]

Figure 126: 6000 A Rear-Connected "T" Vertical (RCTV)



Dimensions: in. [mm]

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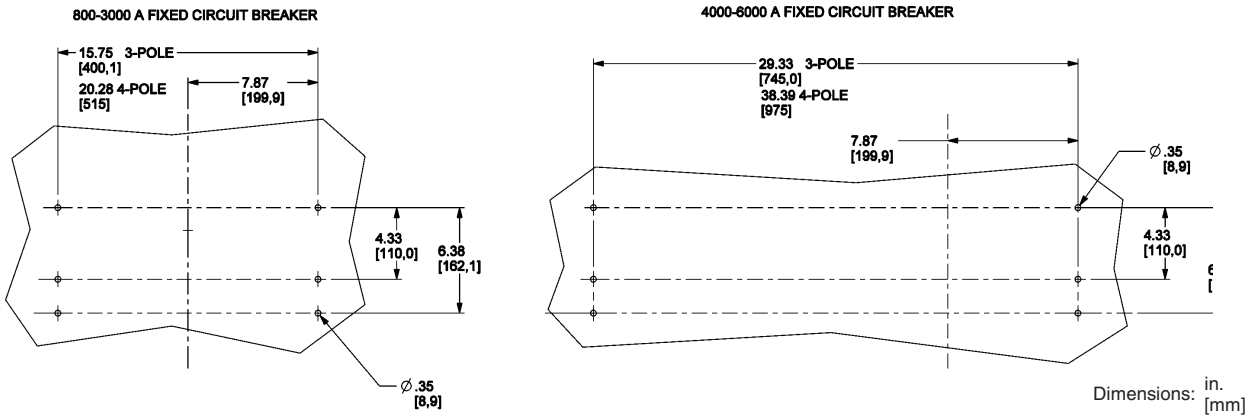
Figure 127: Pan Drawings for 3P and 4P Circuit Breakers



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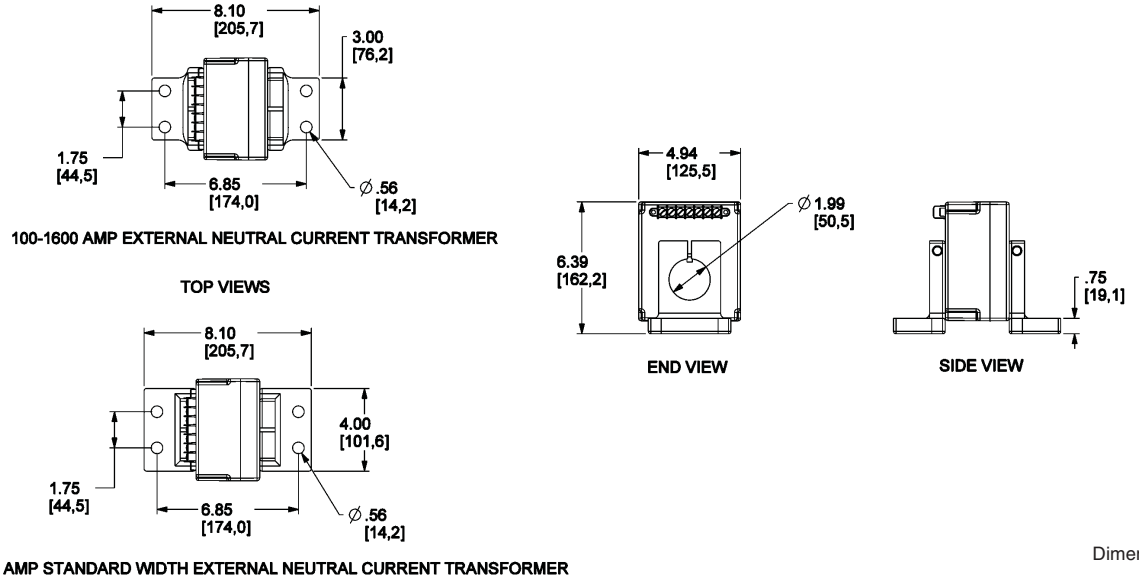
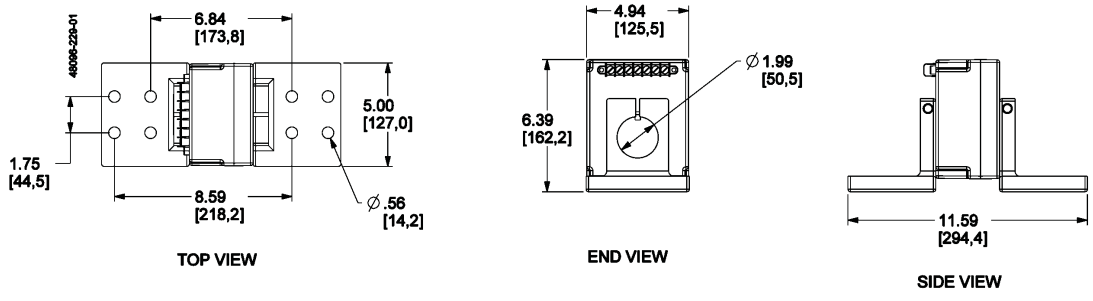
Neutral Current Transformers

Figure 128: Neutral Current Transformer 100–250 A, 400–2000 A



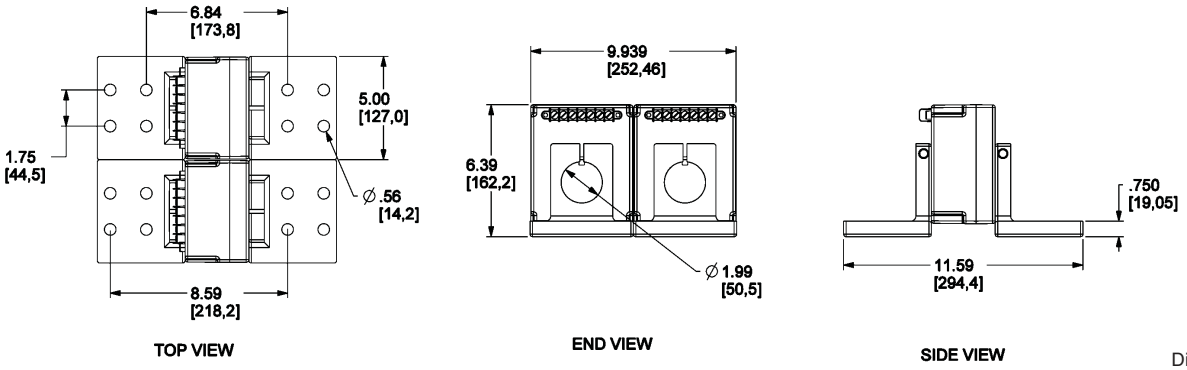
Dimensions: in. [mm]

Figure 129: Neutral Current Transformer 2000–4000 A



Dimensions: in. [mm]

Figure 130: Double Neutral Current Transformer 2000–6300 A



Dimensions: in. [mm]

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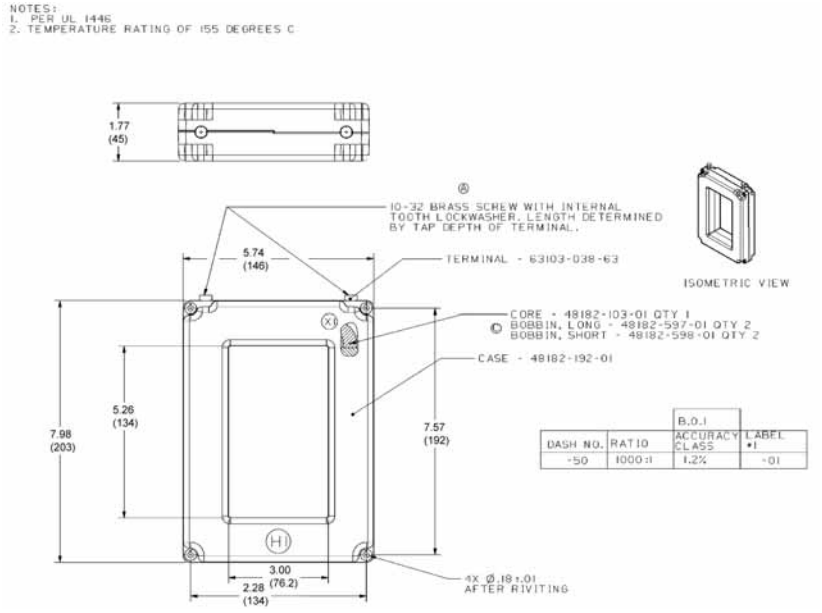
Figure 131: MDGF/SGR Current Transformer



Dimensions: in.

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Figure 132: 800–3200 A Rear-Connected "T" Vertical (RCTV)

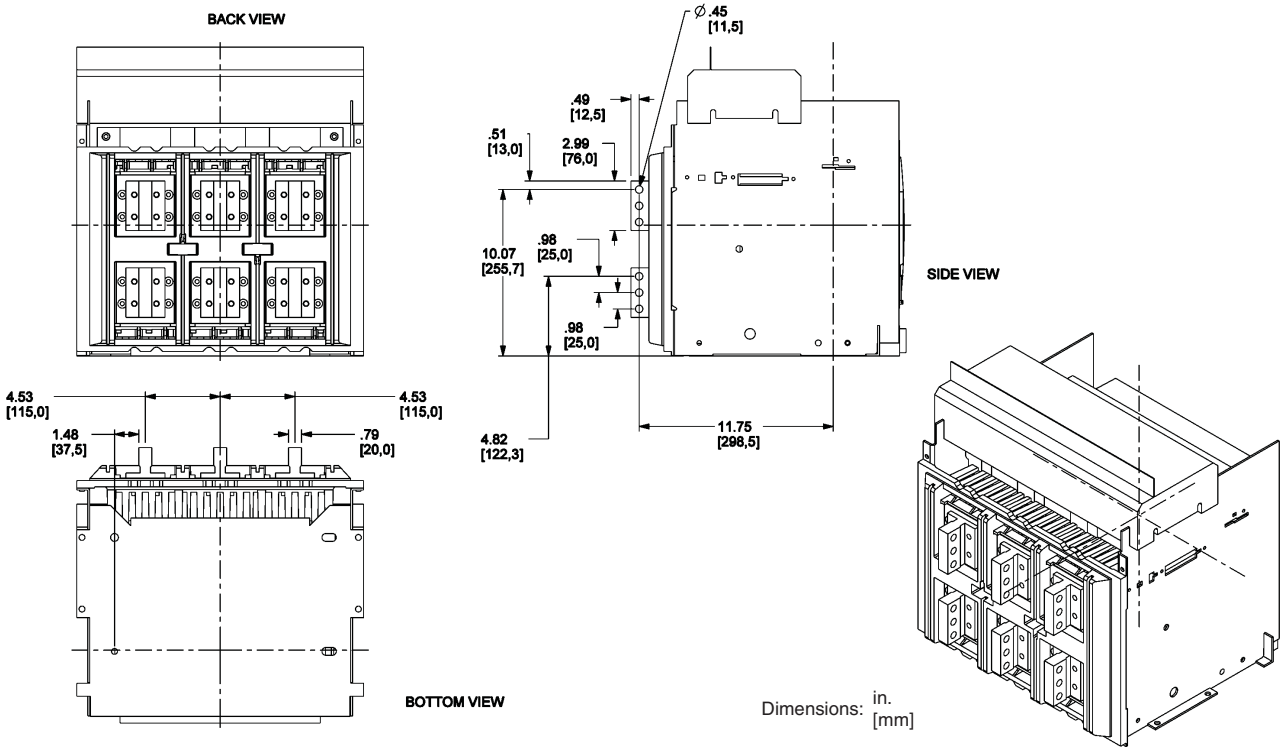

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Figure 133: 800–3200 A Rear-Connected "T" Horizontal (RCTH)

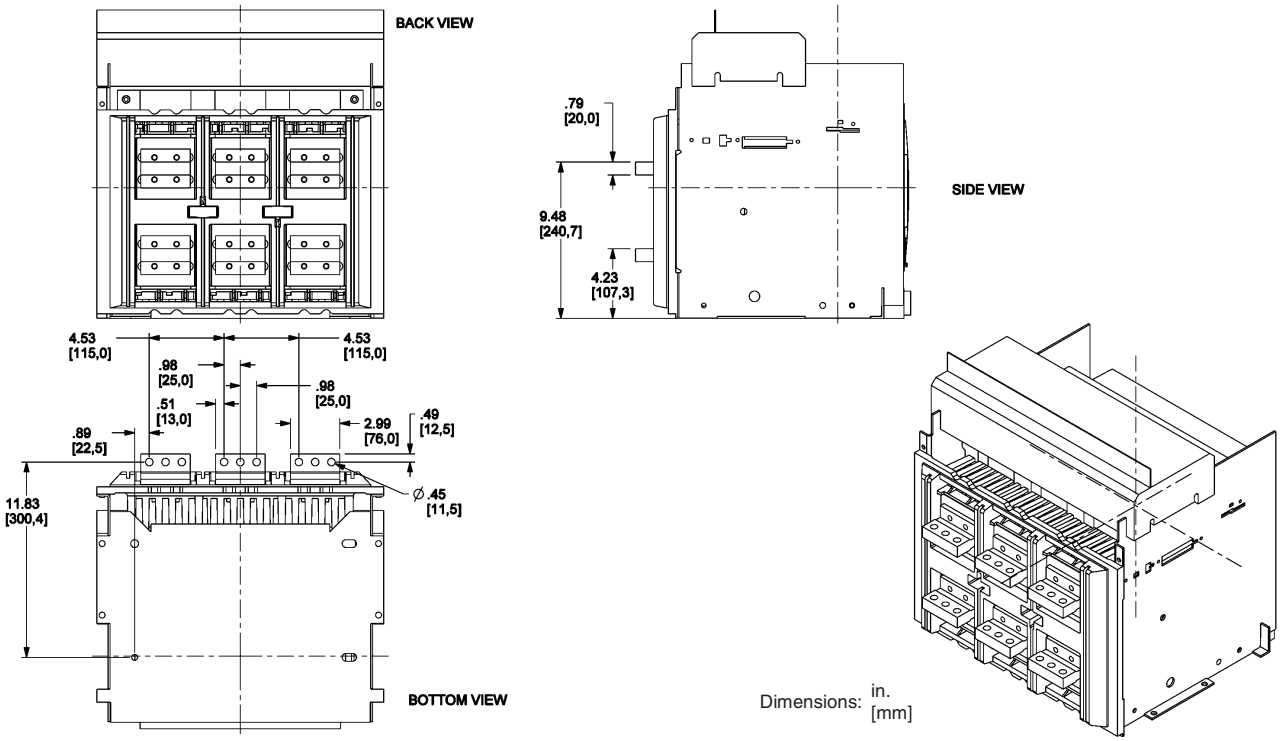

Figure 134: 800–3200 A Front-Connected Flat (FCF)

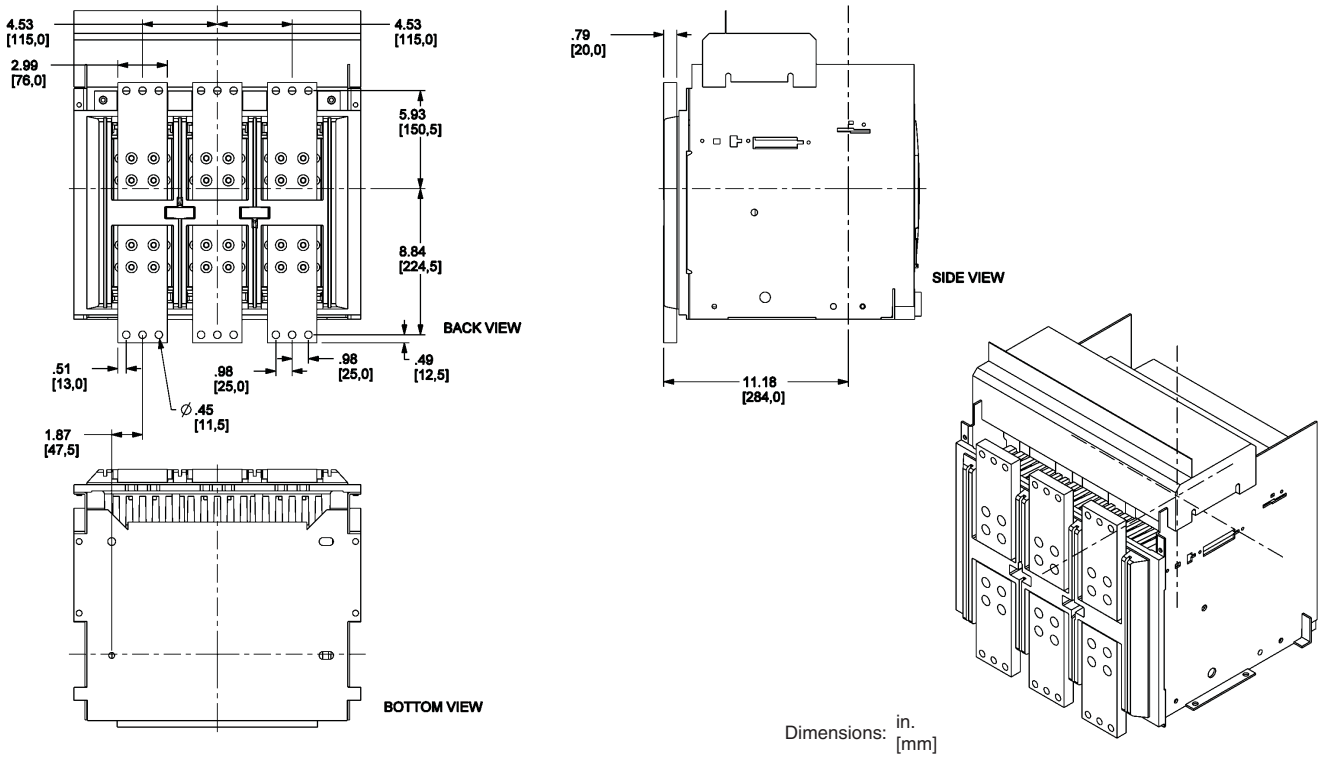

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Figure 135: 4000 A Rear-Connected "T" Vertical (RCTV)

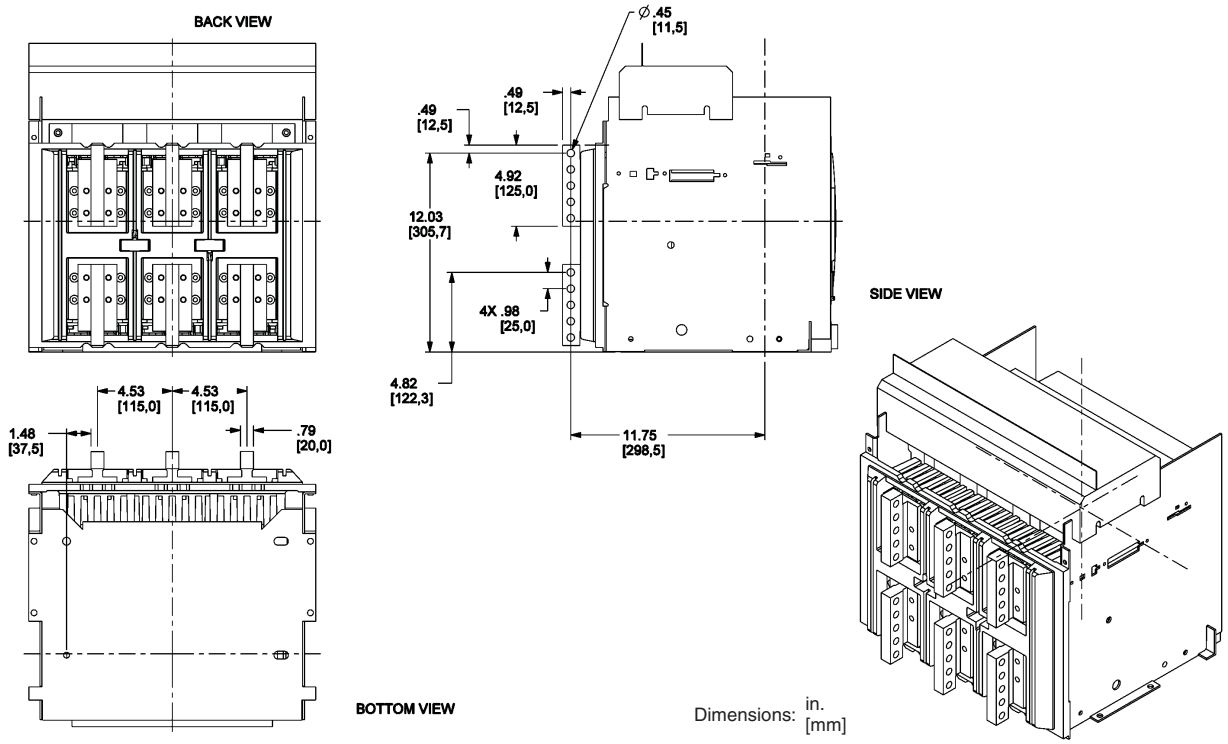

Figure 136: 4000 A Rear-Connected "T" Horizontal (RCTH)

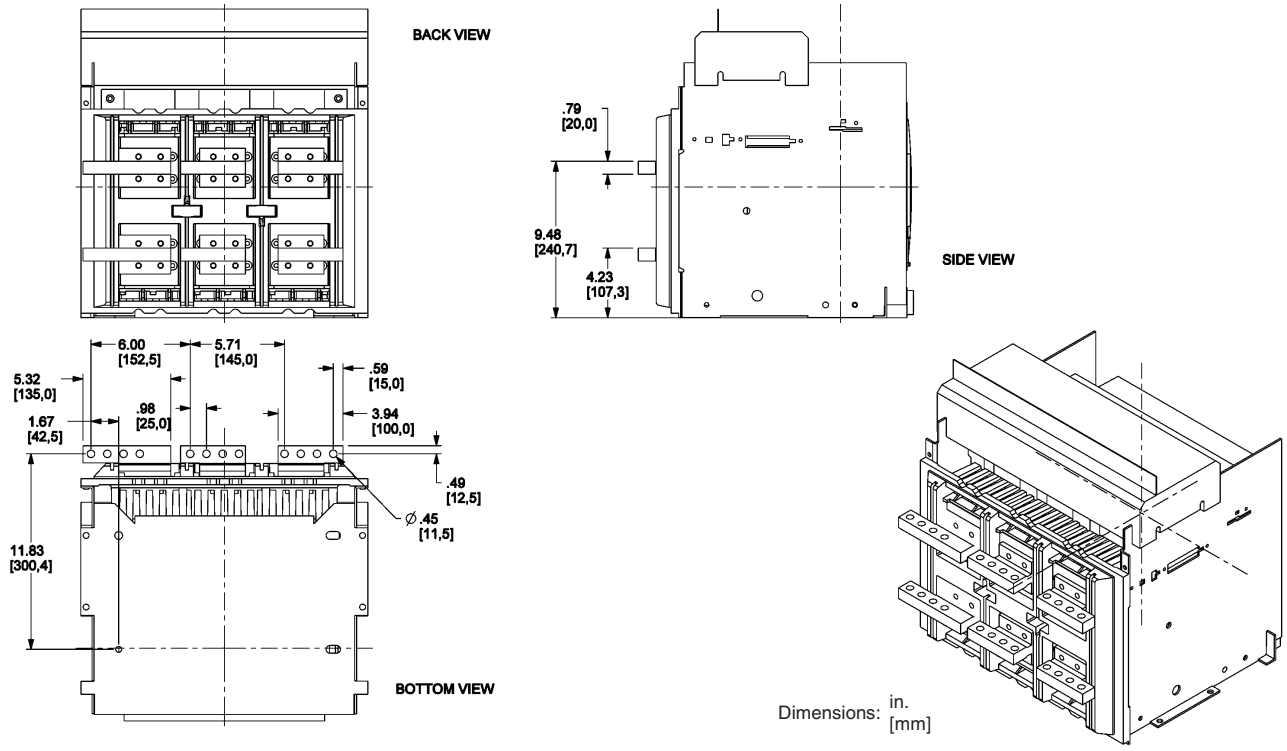

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Figure 137: 5000 A Rear-Connected "T" Vertical (RCTV)

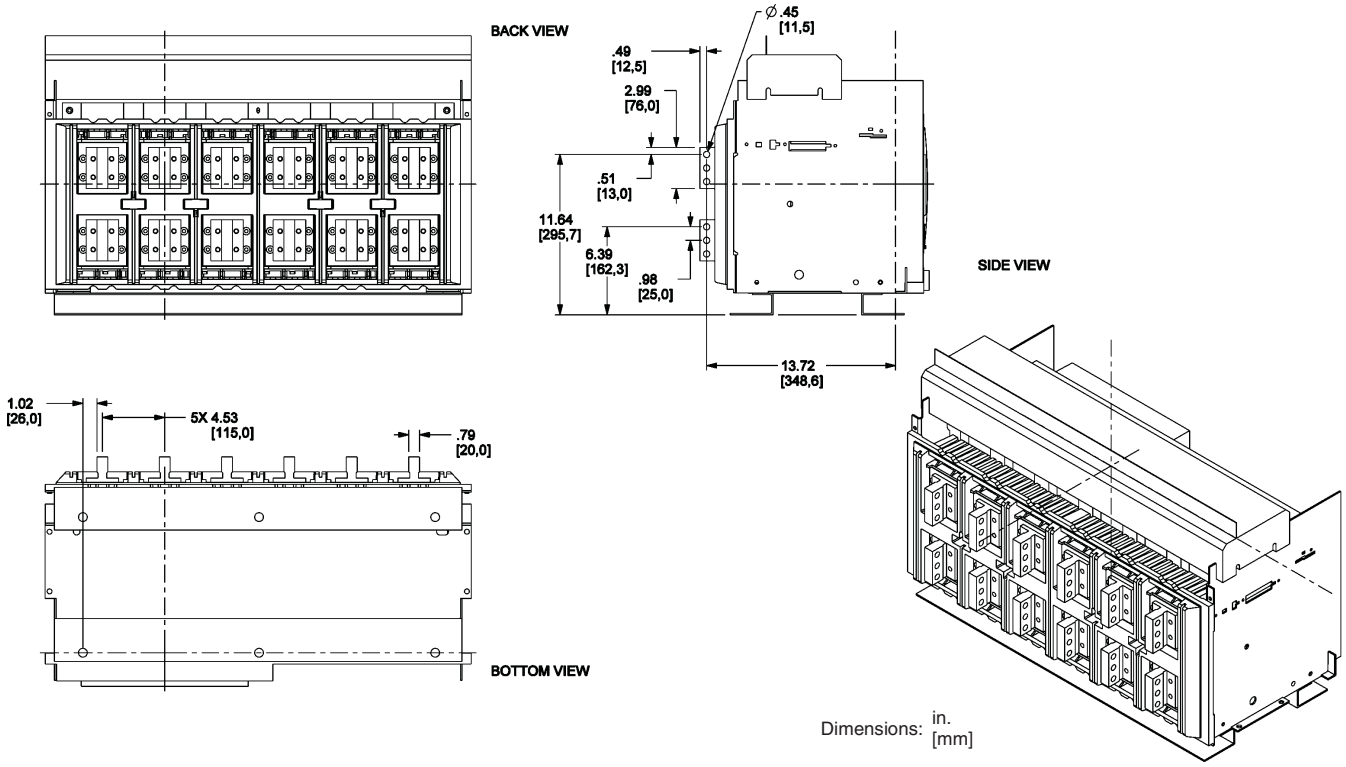

Figure 138: 5000 A Rear-Connected "T" Horizontal (RCTH)

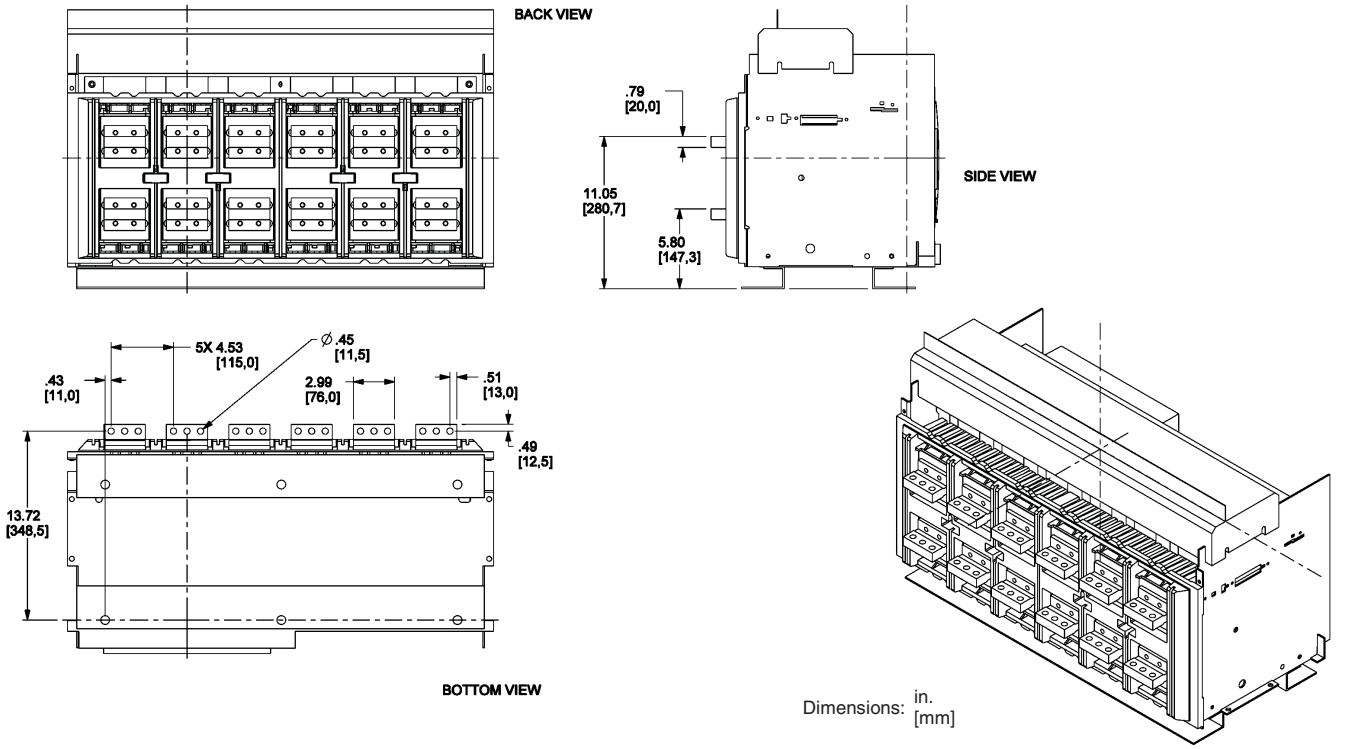

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Figure 139: 6300 A Rear-Connected "T" Vertical (RCTV)

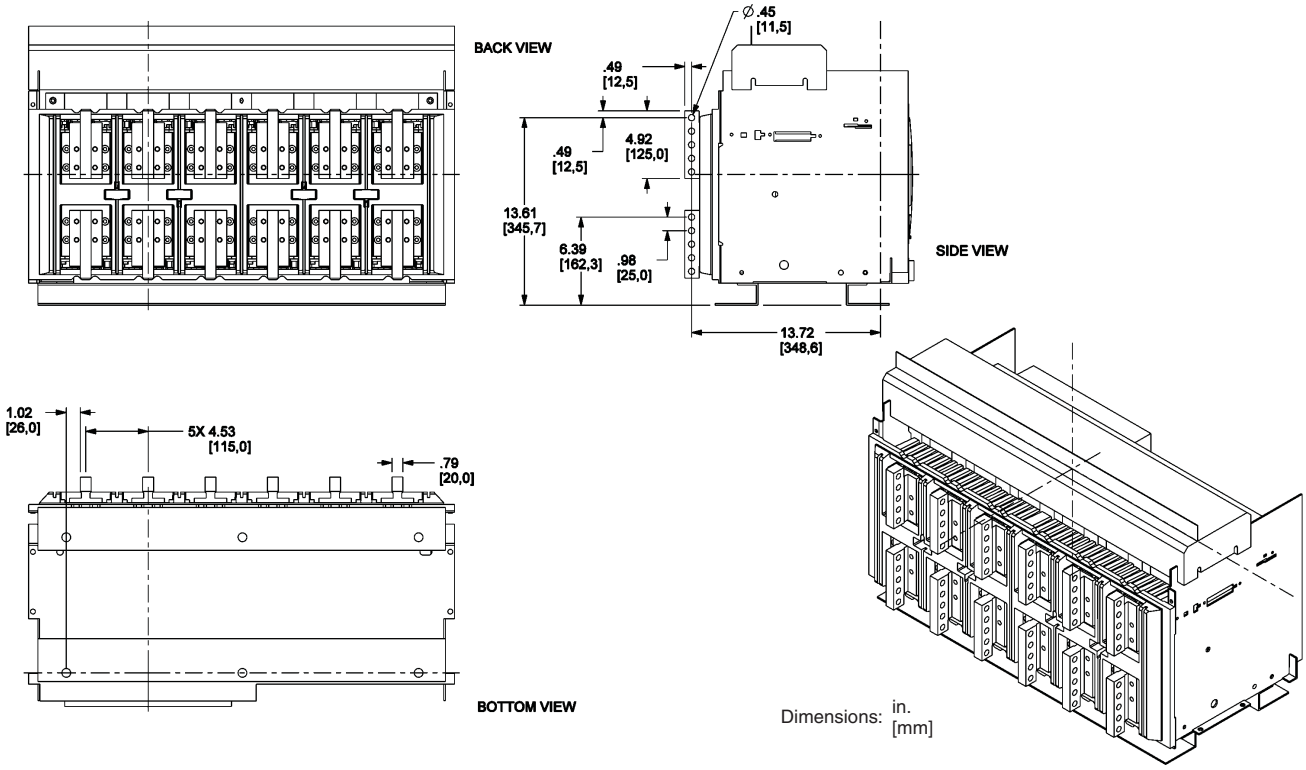

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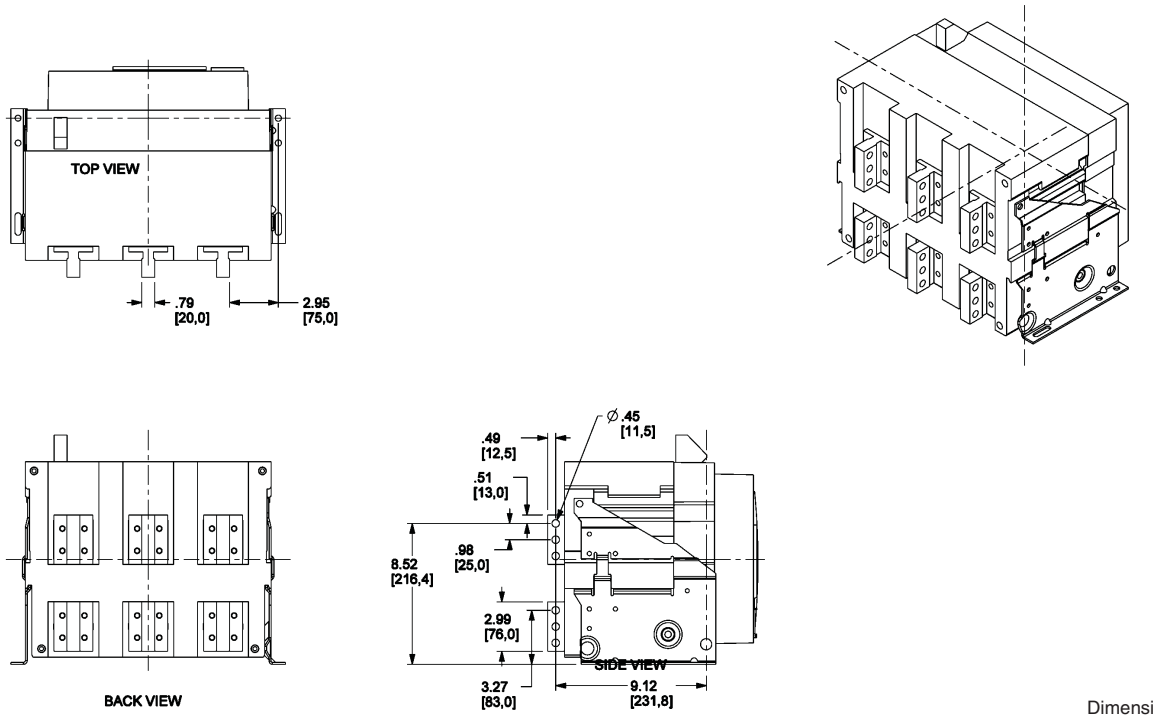
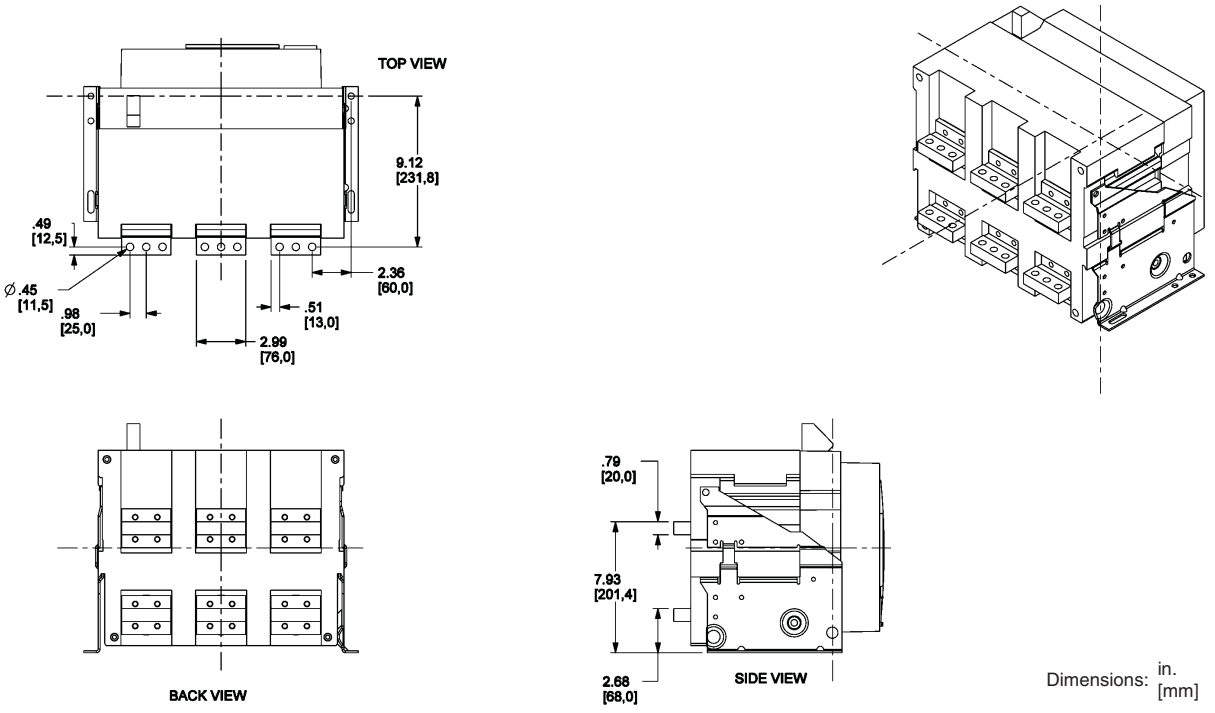
Figure 140: 800–3200 A Rear-Connected "T" Vertical (RCTV)



Dimensions: in. [mm]

Figure 141: 800–3200 A Rear-Connected "T" Horizontal (RCTH)



Dimensions: in. [mm]

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Figure 142: 800–3200 A Front-Connected Flat (FCF)

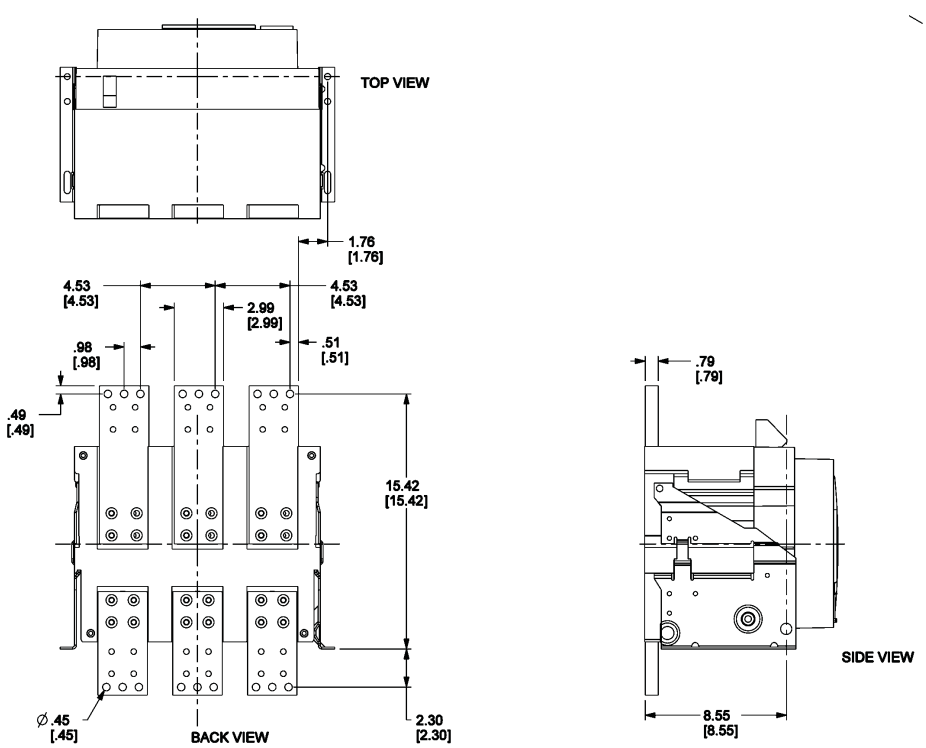

Figure 143: 4000 A Rear-Connected "T" Vertical (RCTV)

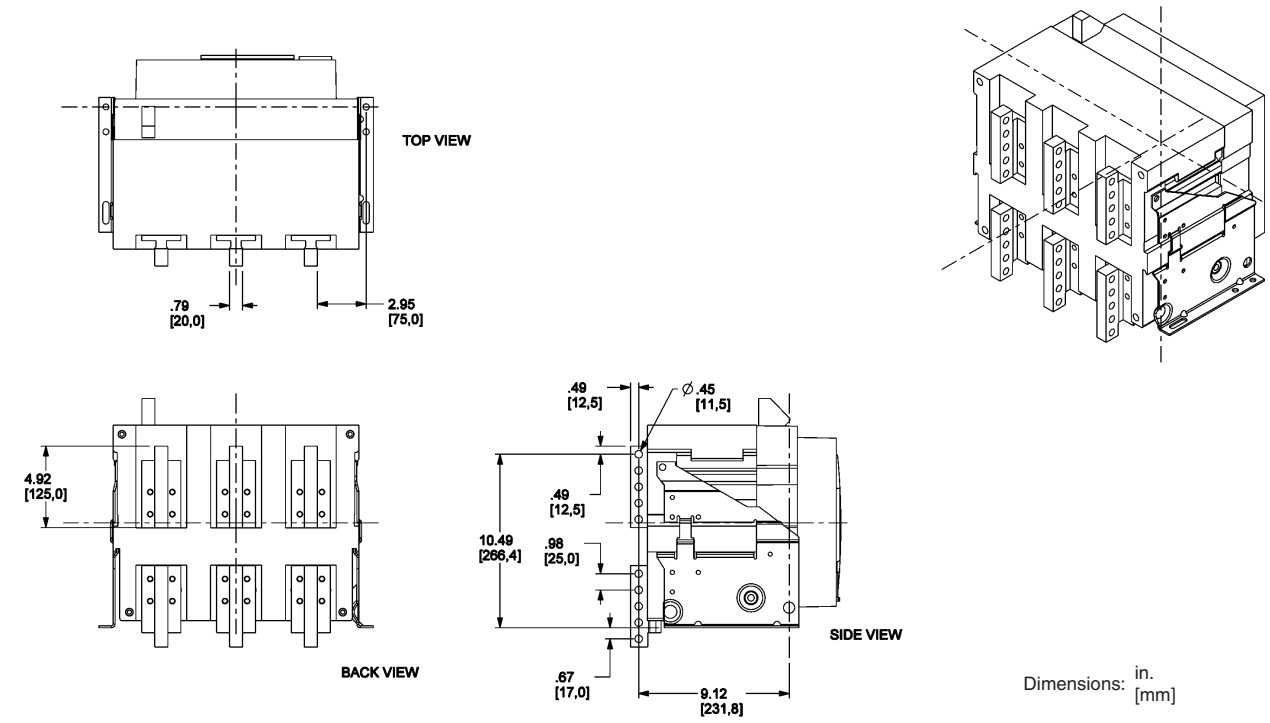

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Figure 144: 4000 A Rear-Connected "T" Horizontal (RCTH)

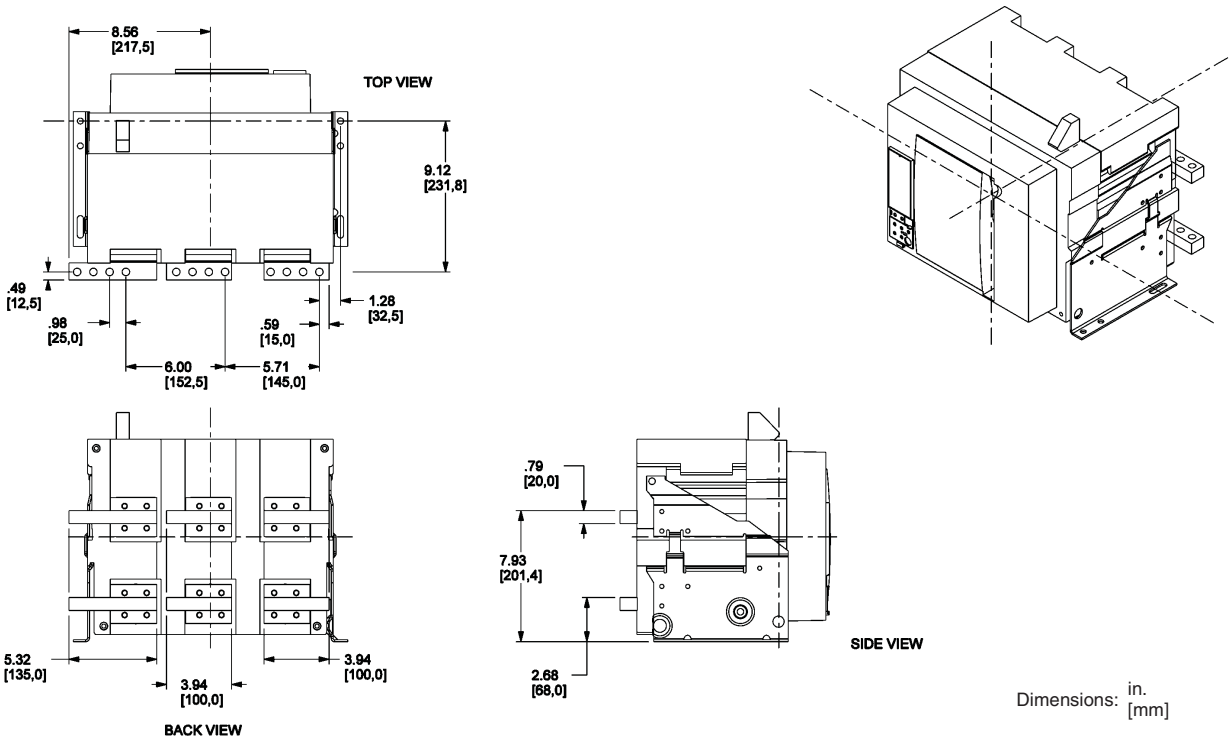

Figure 145: 5000 A Rear-Connected "T" Vertical (RCTV)

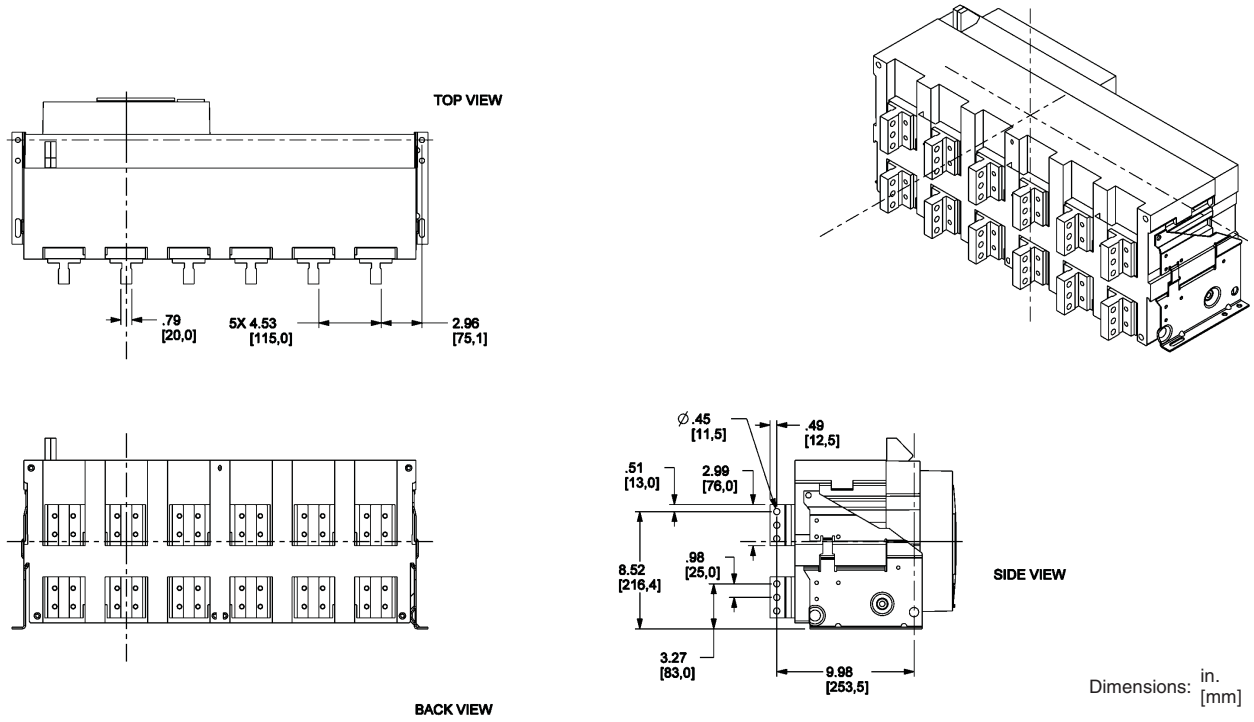

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Figure 146: 5000 A Rear-Connected "T" Horizontal (RCTH)

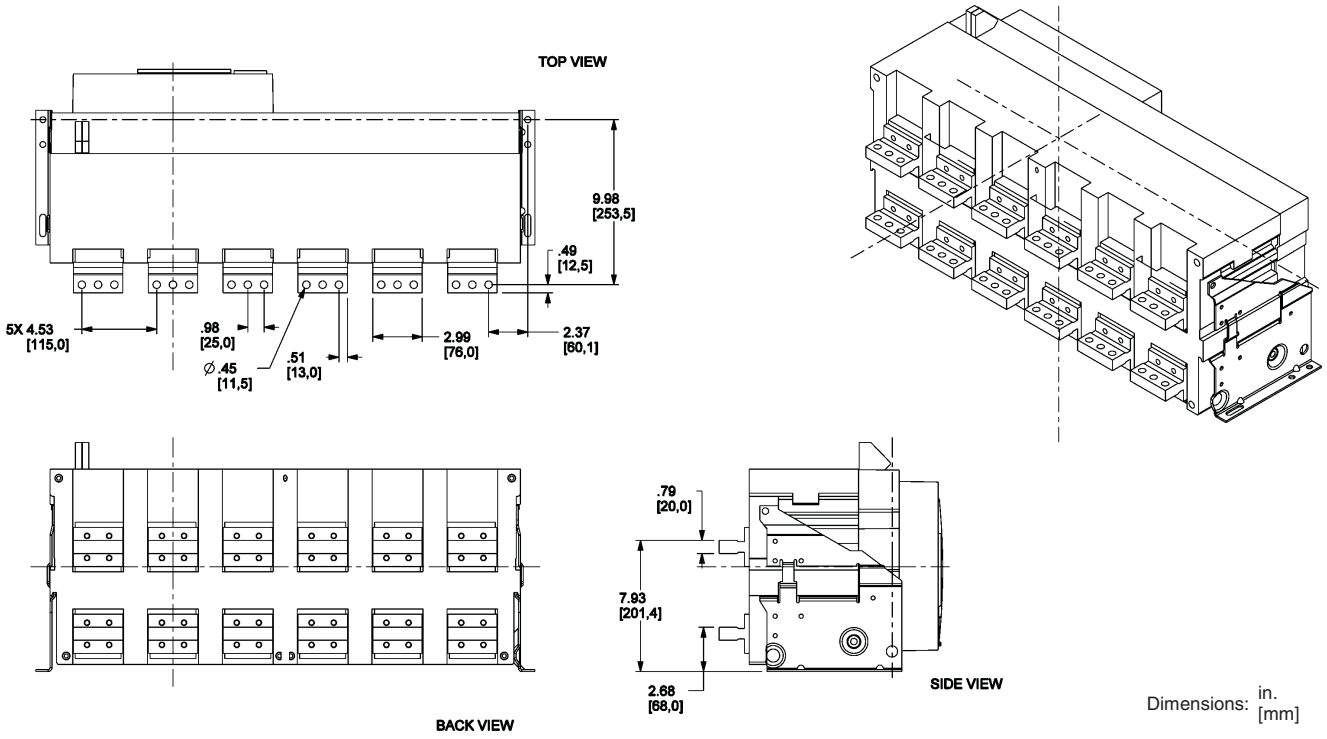

Figure 147: 6300 A Rear-Connected "T" Vertical (RCTV)

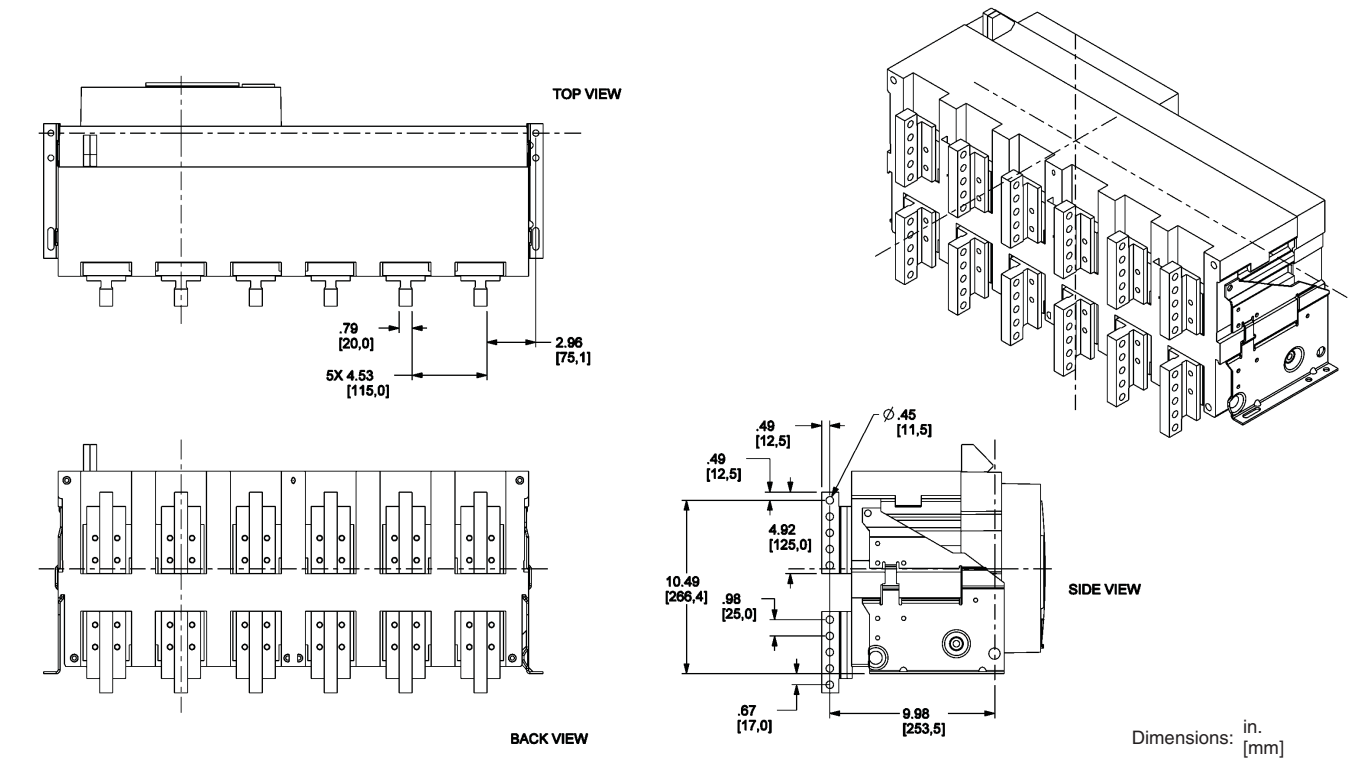

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Figure 148: 800–3200 A Rear-Connected "T" Vertical (RCTV)

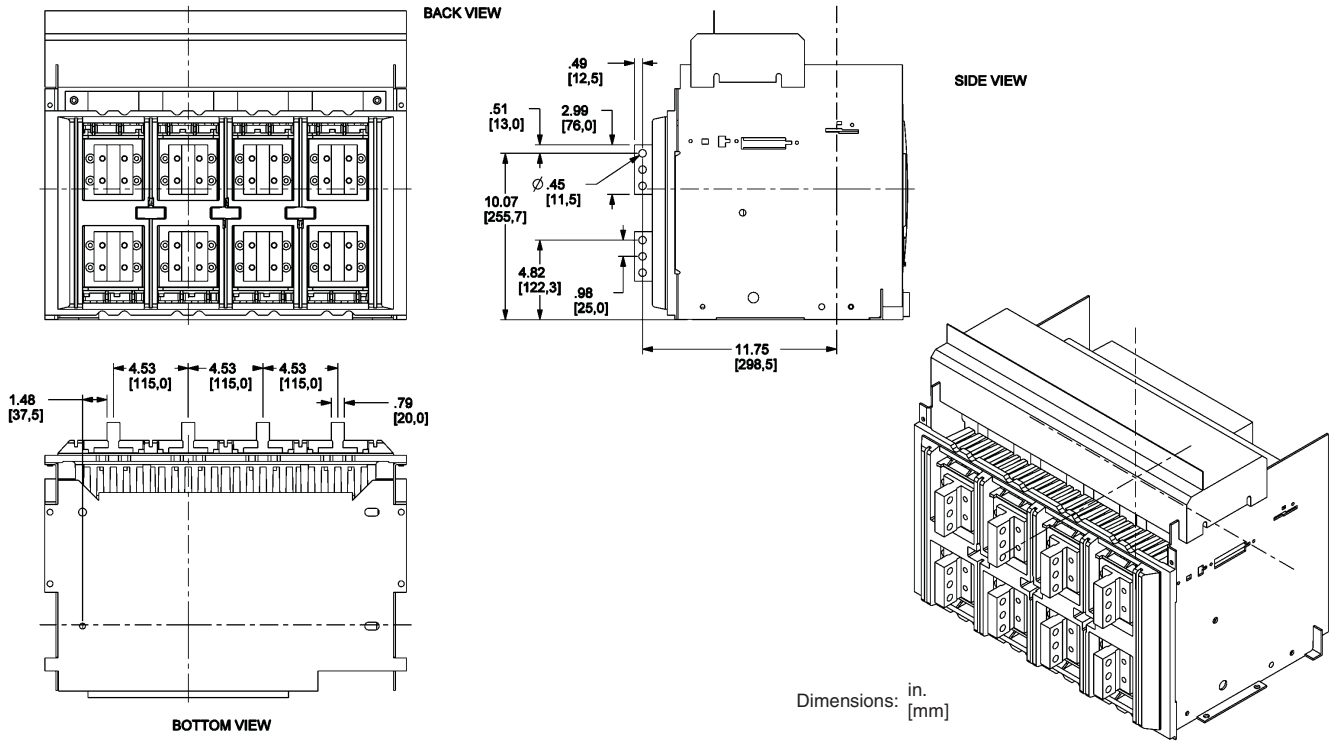

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Figure 149: 800–3200 A Rear-Connected "T" Horizontal (RCTH)

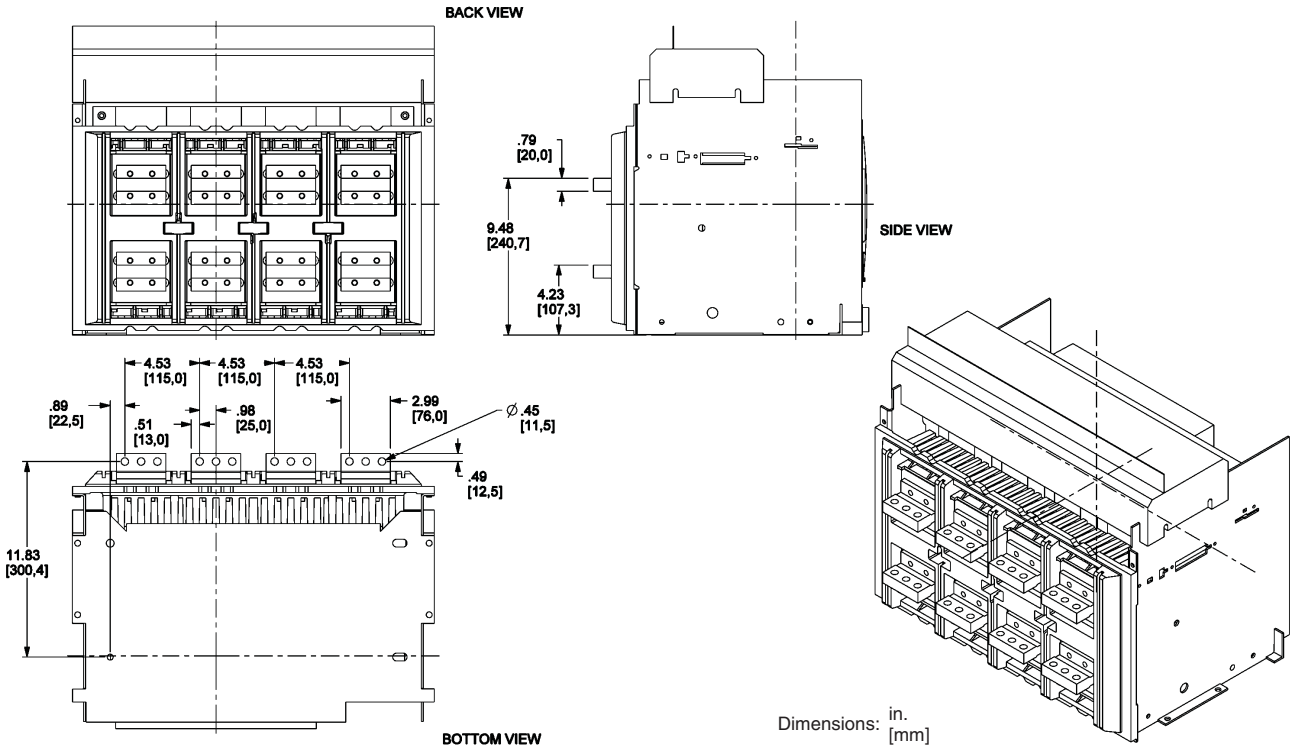

Figure 150: 800–3200 A Front-Connected Flat (FCF)

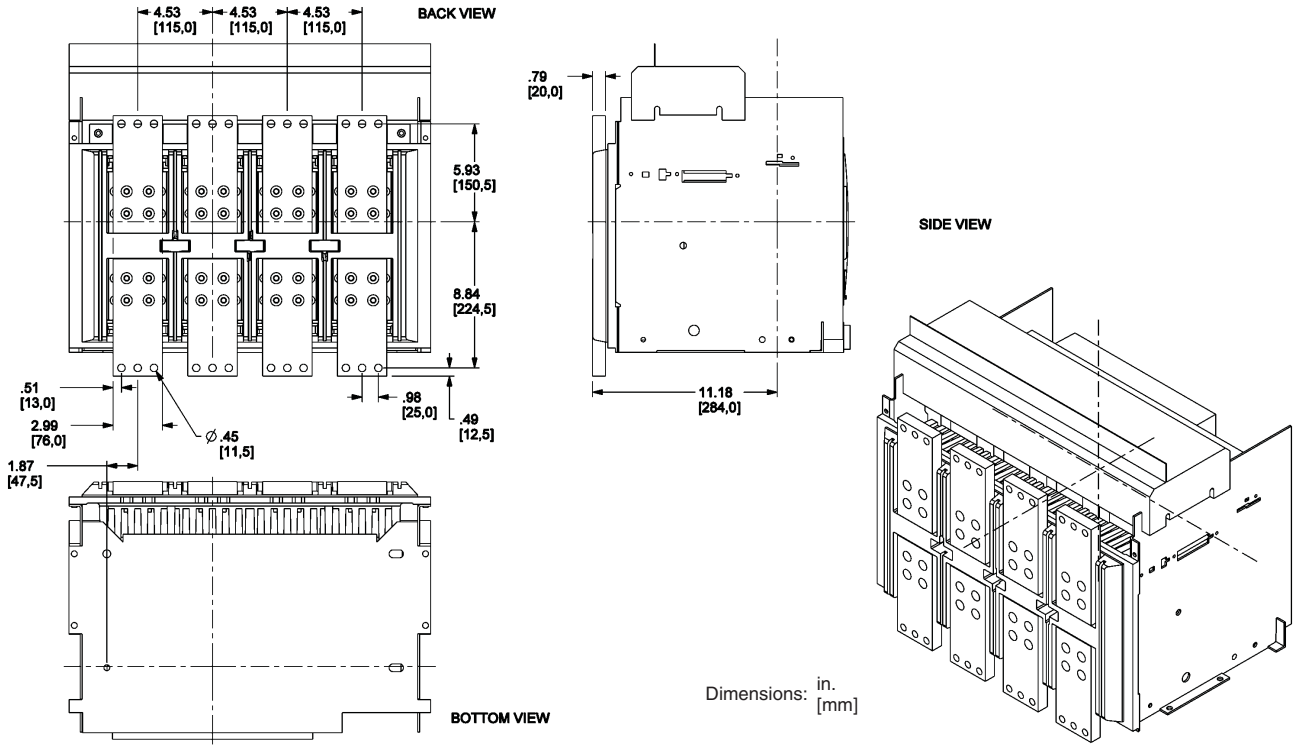

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Figure 151: 4000 A Rear-Connected "T" Vertical (RCTV)

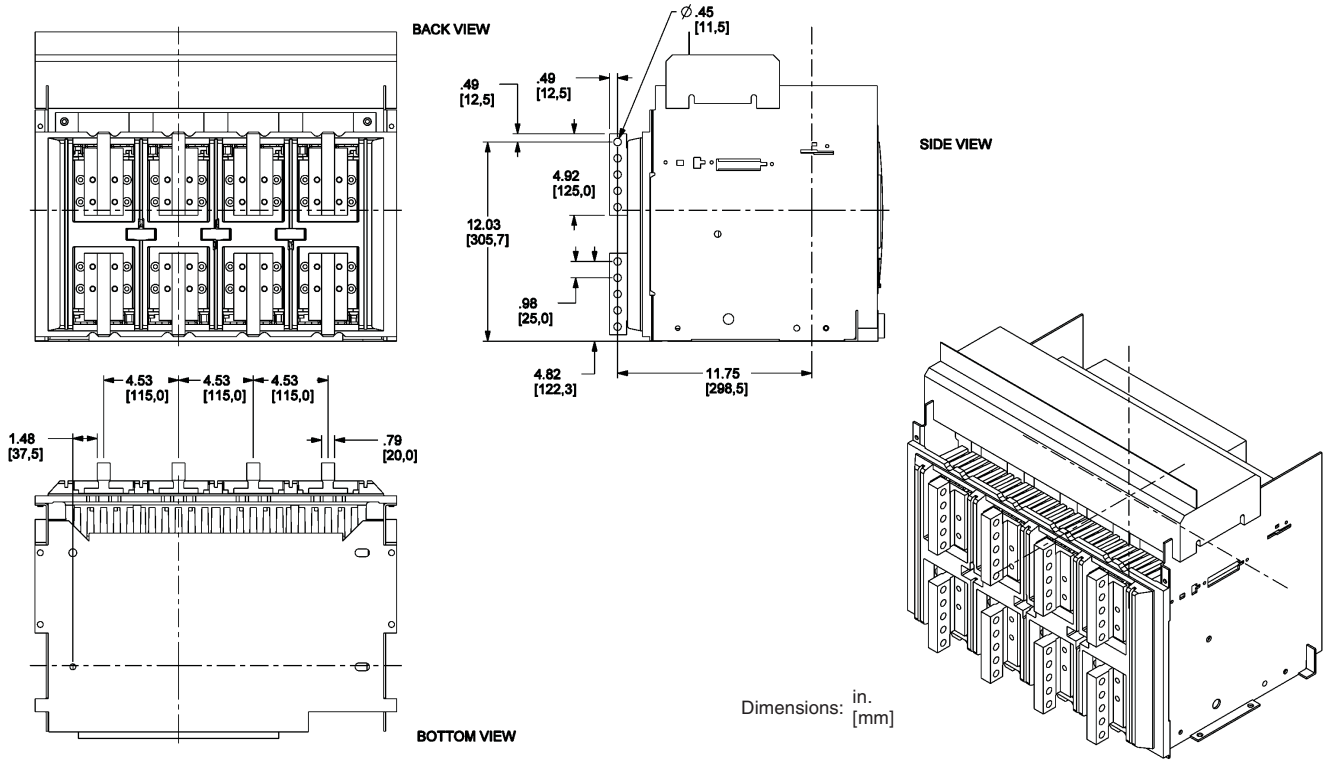

Figure 152: 4000 A Rear-Connected "T" Horizontal (RCTH)

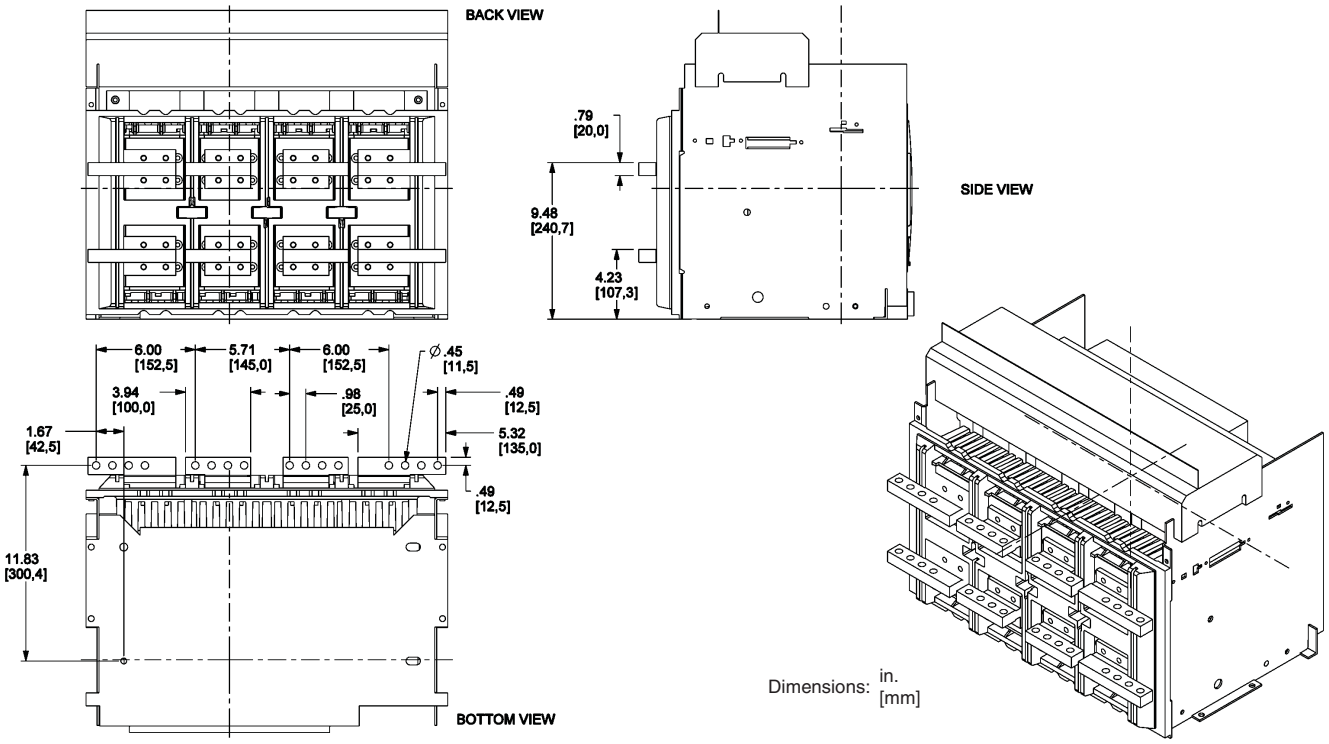

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Figure 153: 5000 A Rear-Connected "T" Vertical (RCTV)

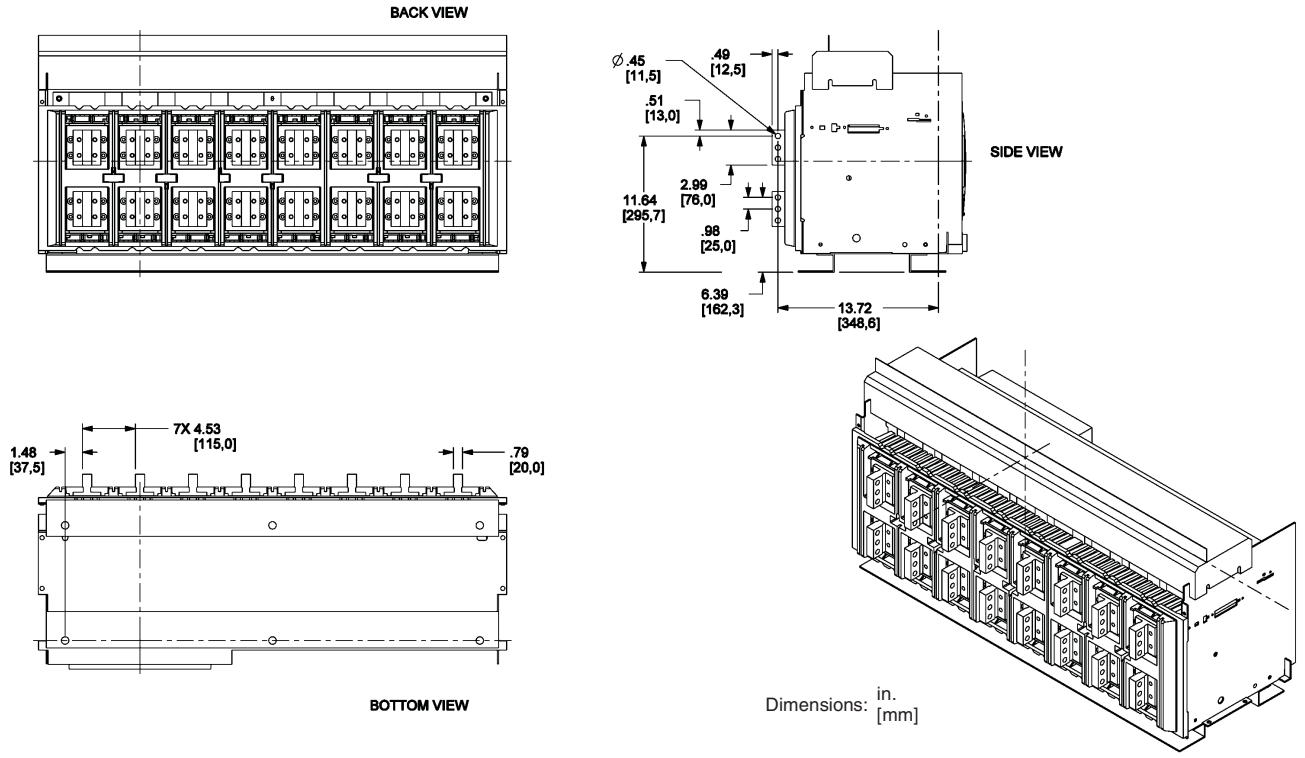

Figure 154: 5000 A Rear-Connected "T" Horizontal (RCTH)

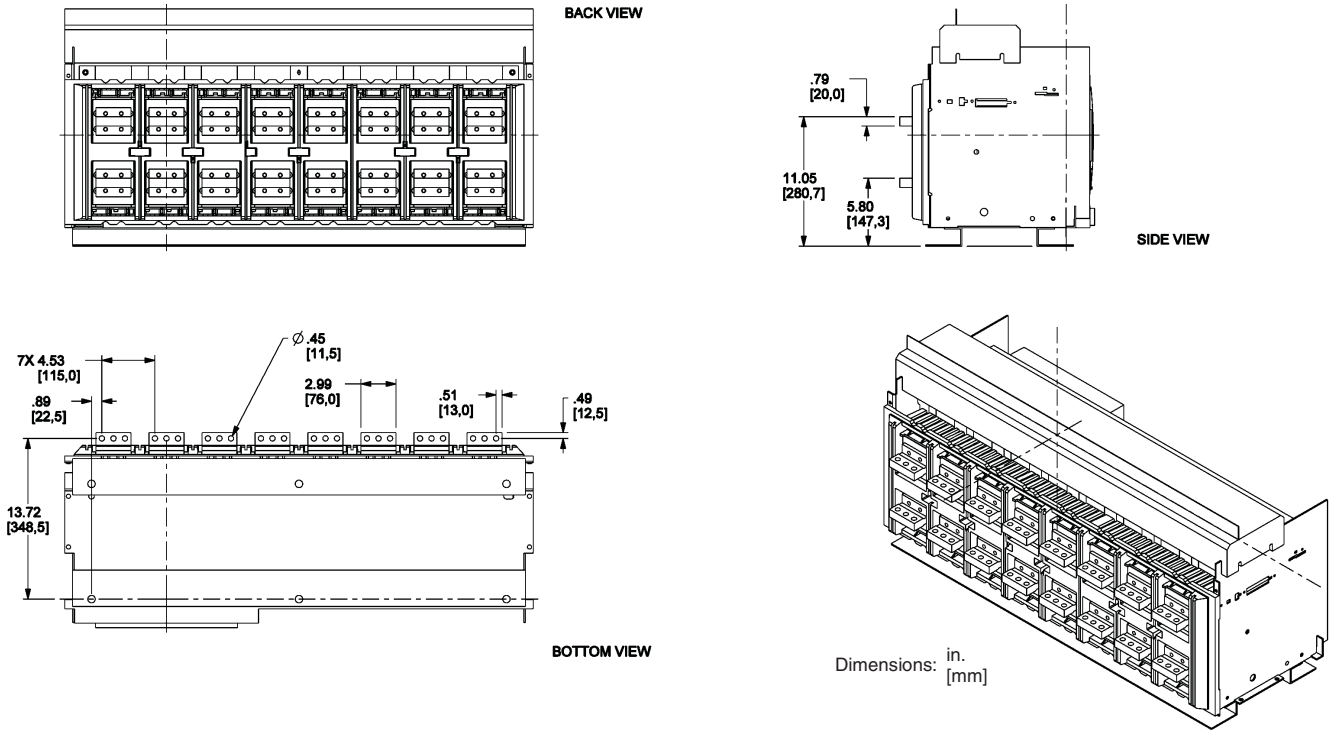

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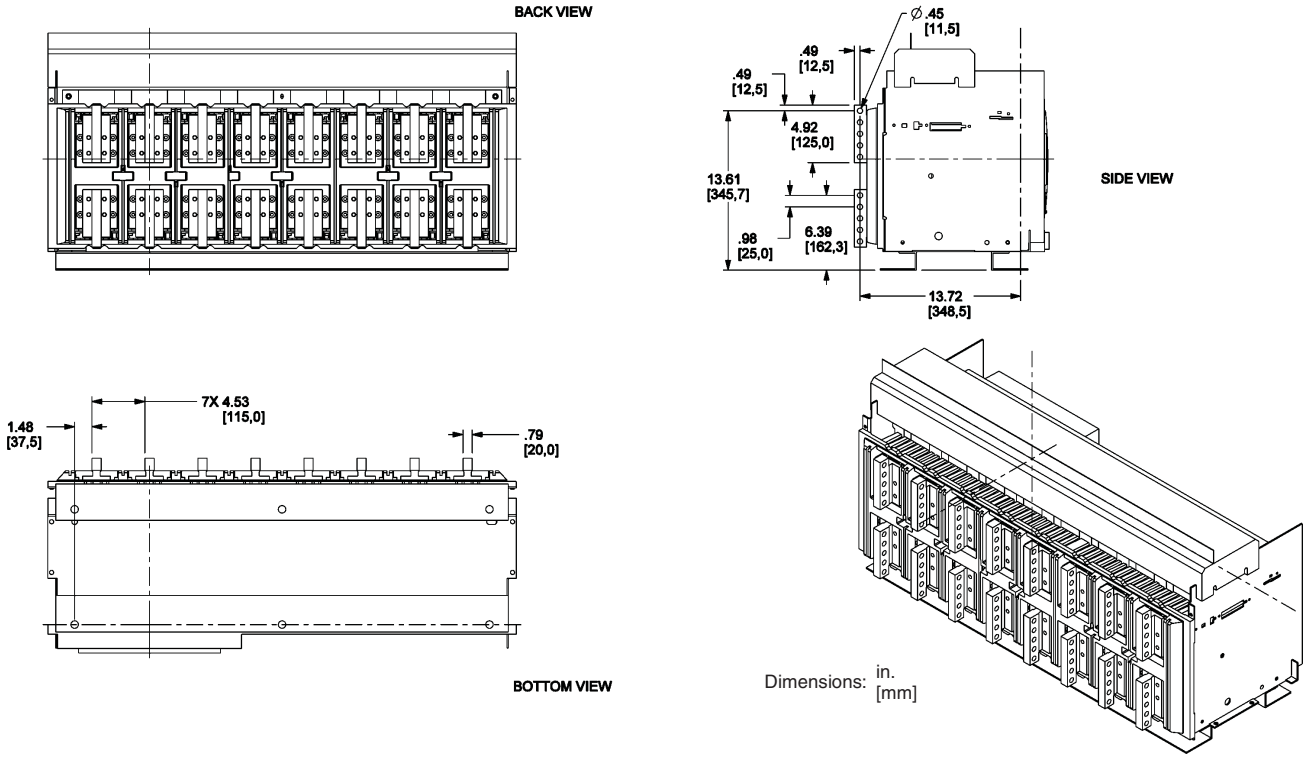
Figure 155: 6300 A Rear-Connected "T" Vertical (RCTV)



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IEC 4P Fixed Circuit Breakers

Figure 156: 800–3200 A Rear-Connected "T" Vertical (RCTV)

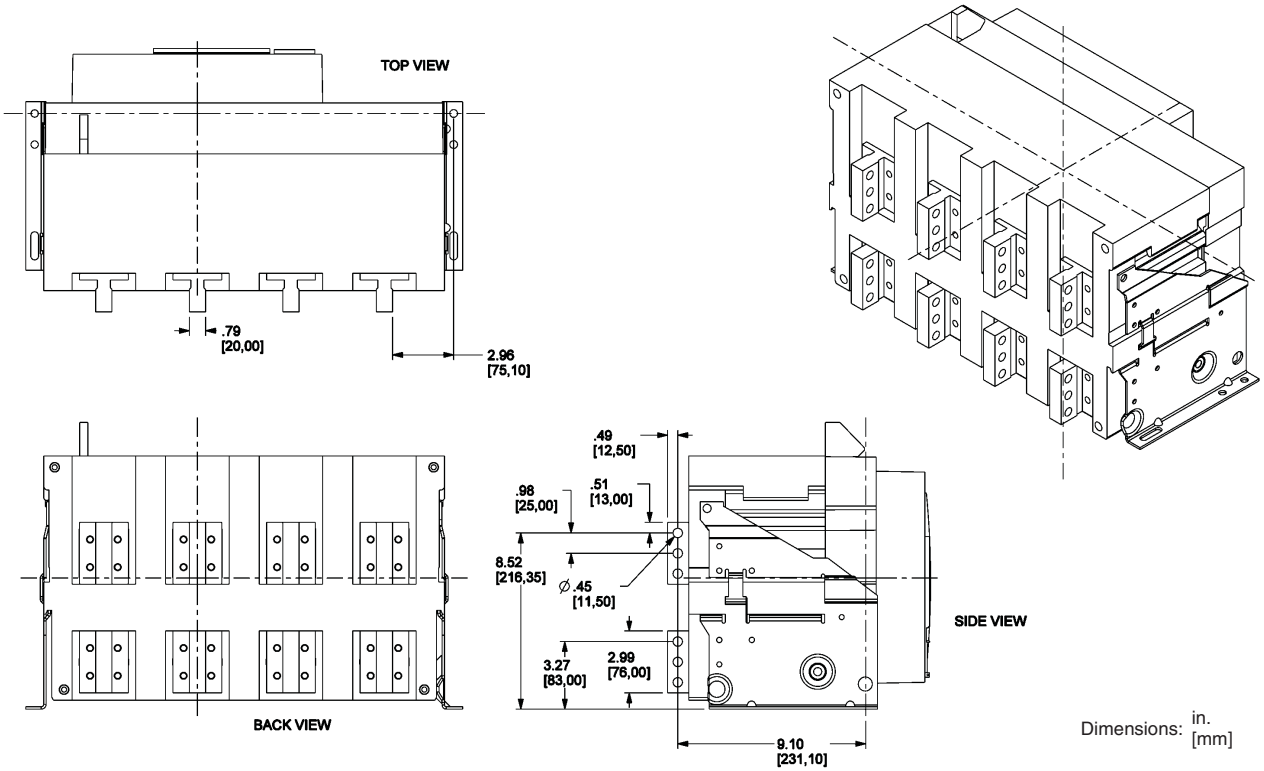

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Figure 157: 800–3200 A Rear-Connected "T" Horizontal (RCTH)

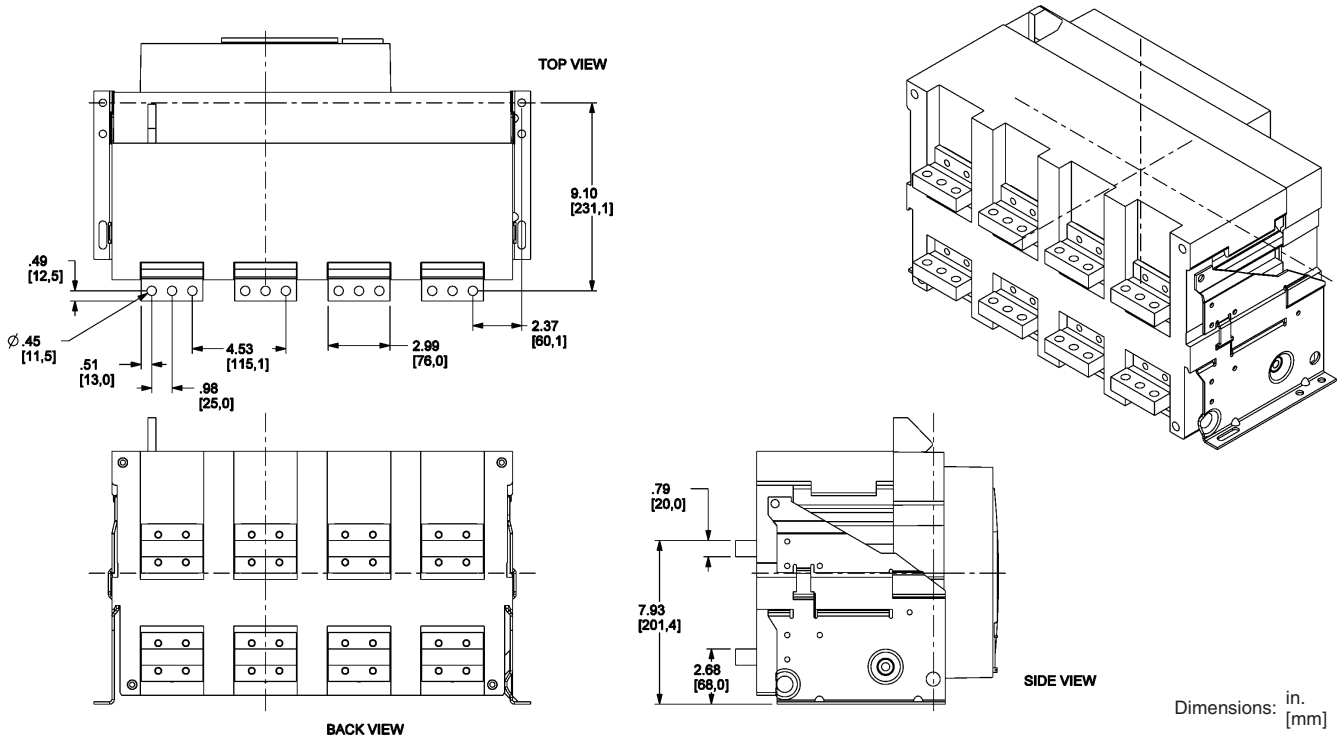

Figure 158: 800–3200 A Front-Connected Flat (FCF)

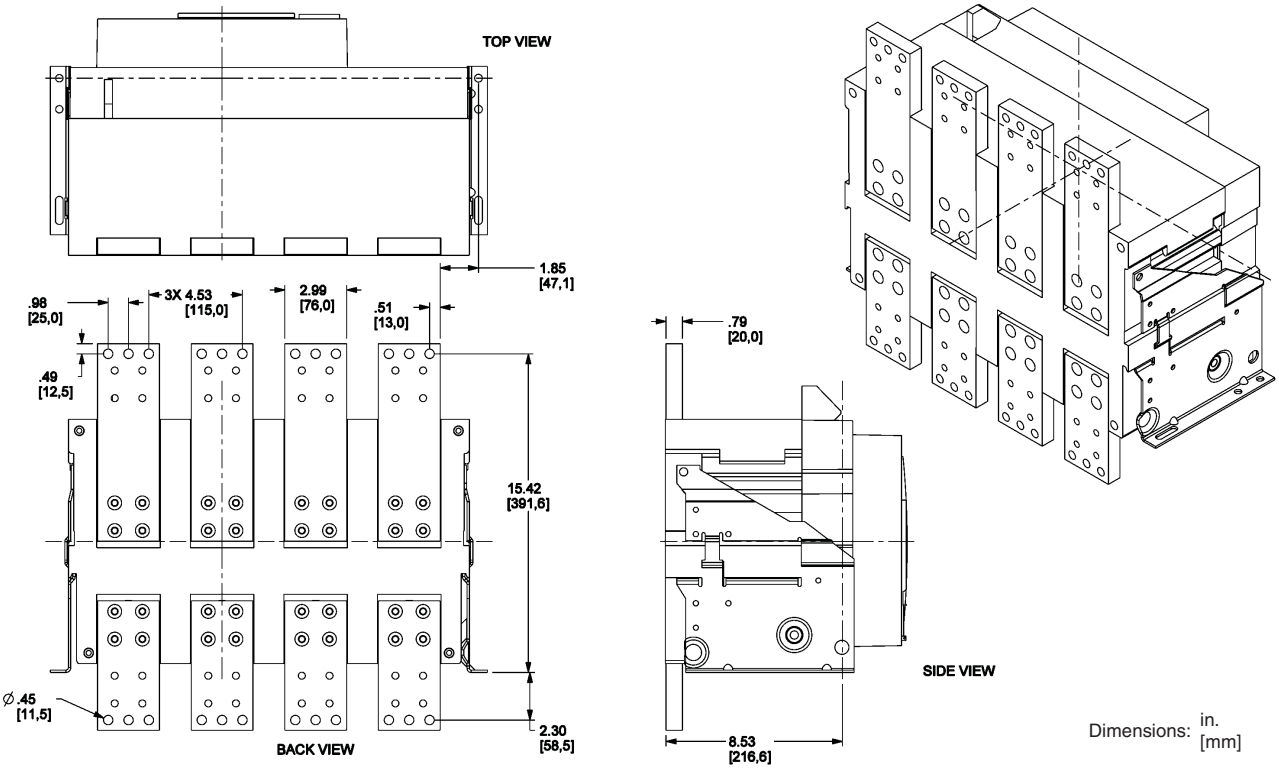

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Figure 159: 4000 A Rear-Connected "T" Vertical (RCTV)

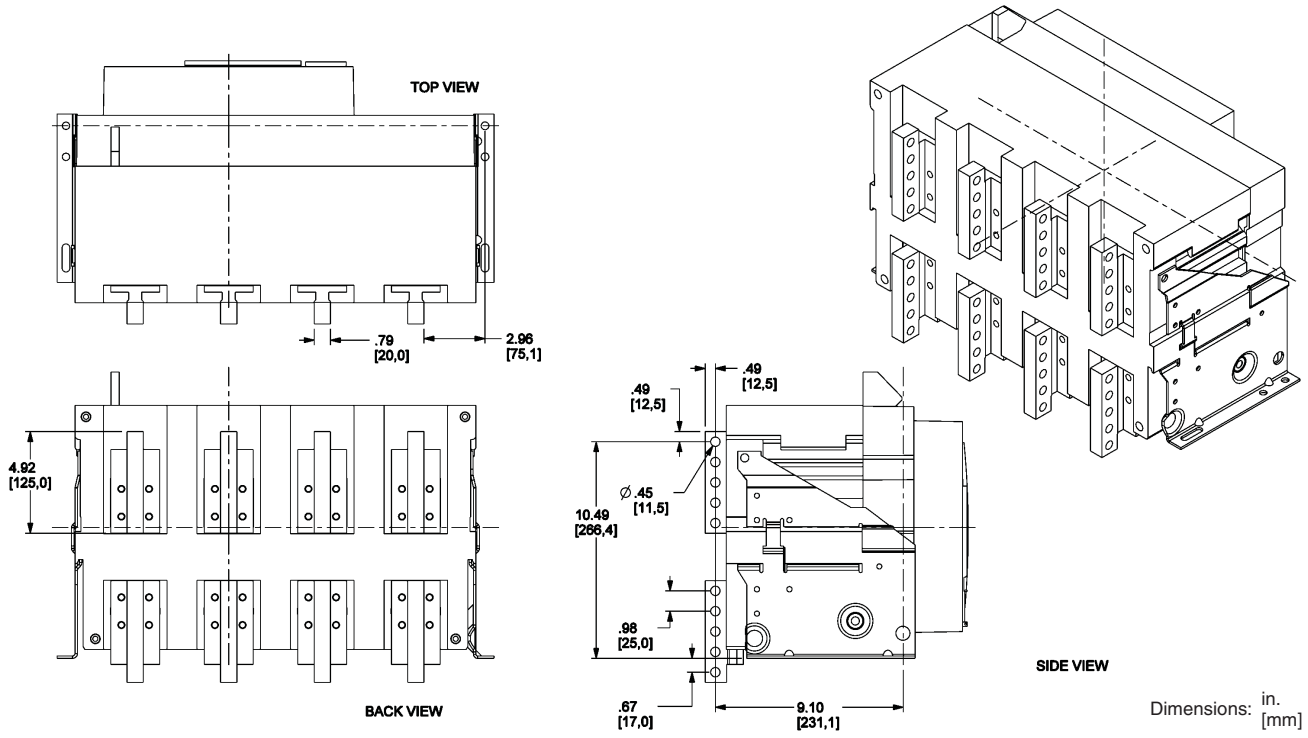

Figure 160: 4000 A Rear-Connected "T" Horizontal (RCTH)

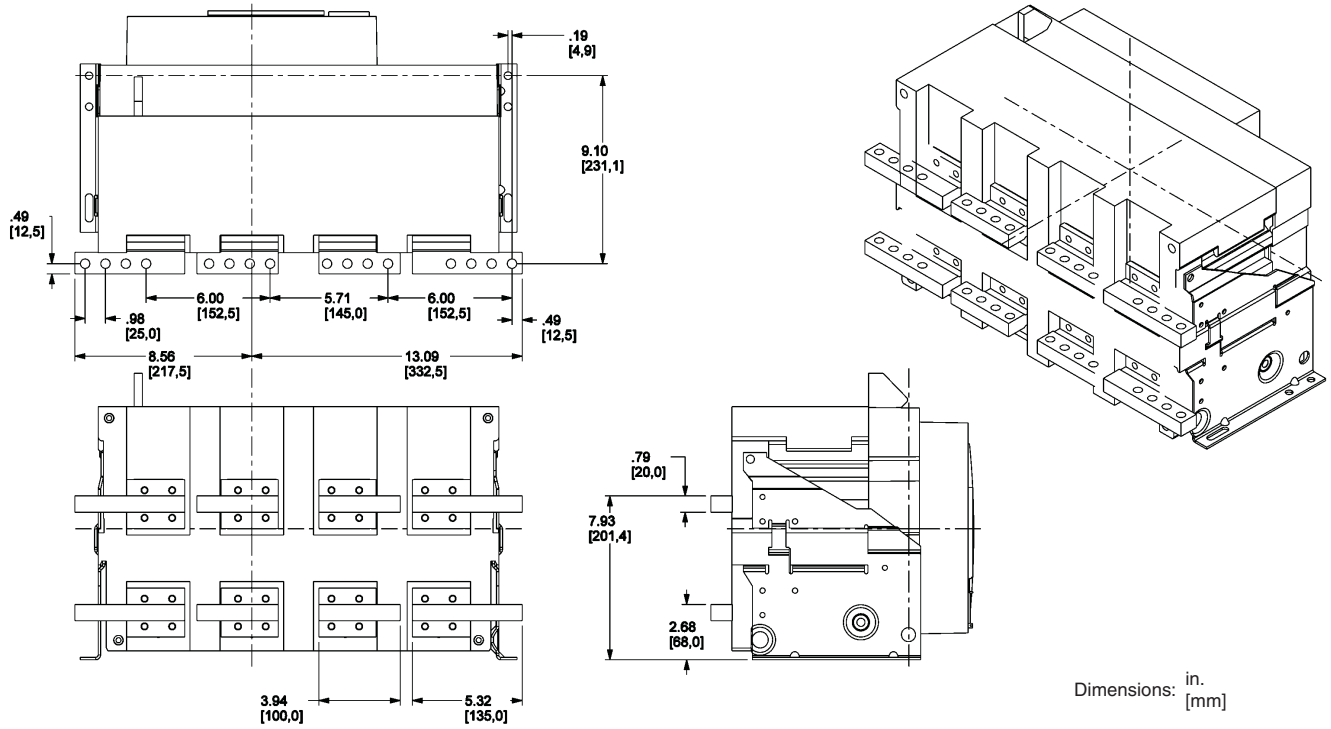

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Figure 161: 5000 A Rear-Connected "T" Vertical (RCTV)

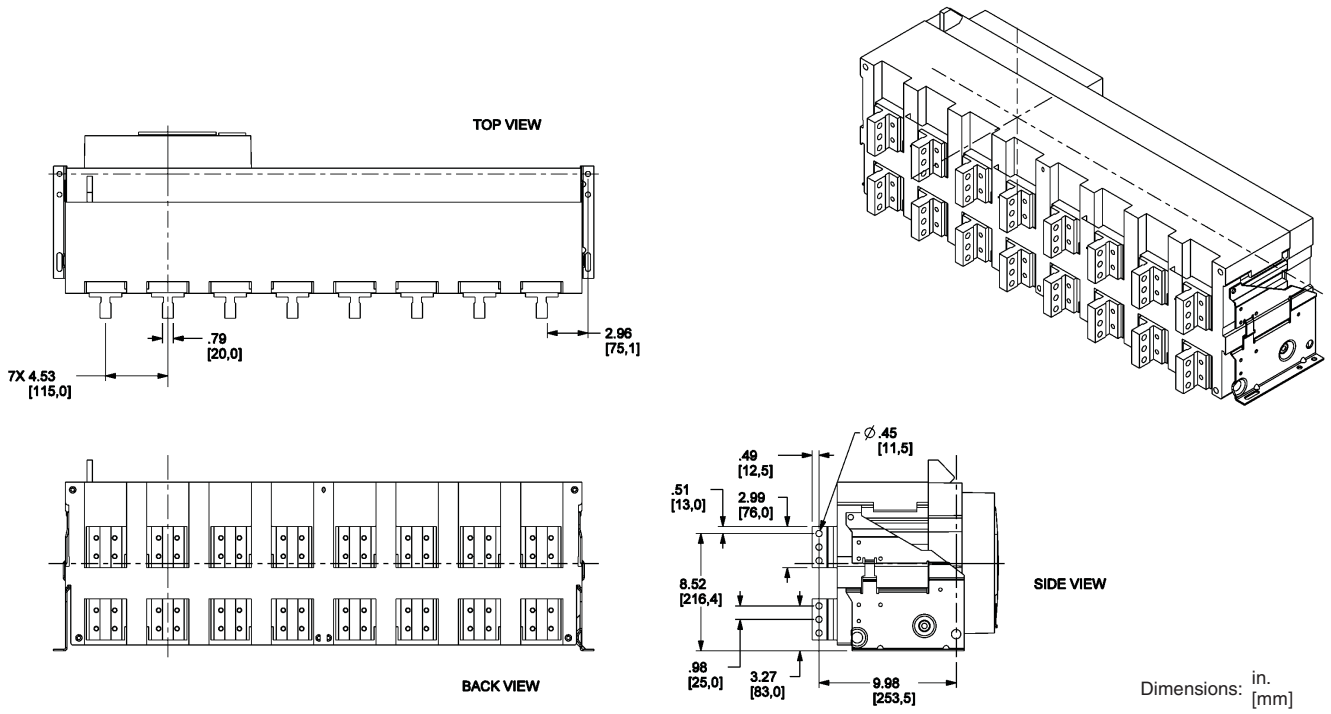

Figure 162: 5000 A Rear-Connected "T" Horizontal (RCTH)

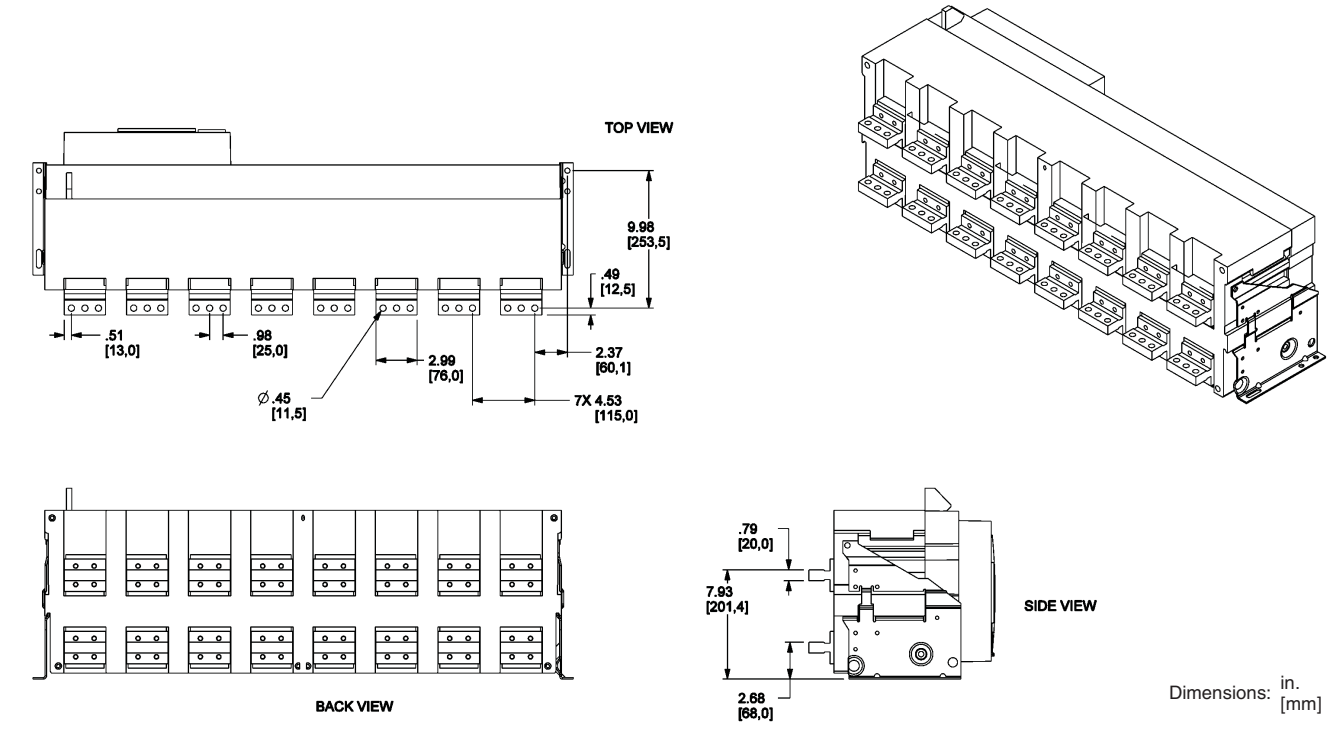

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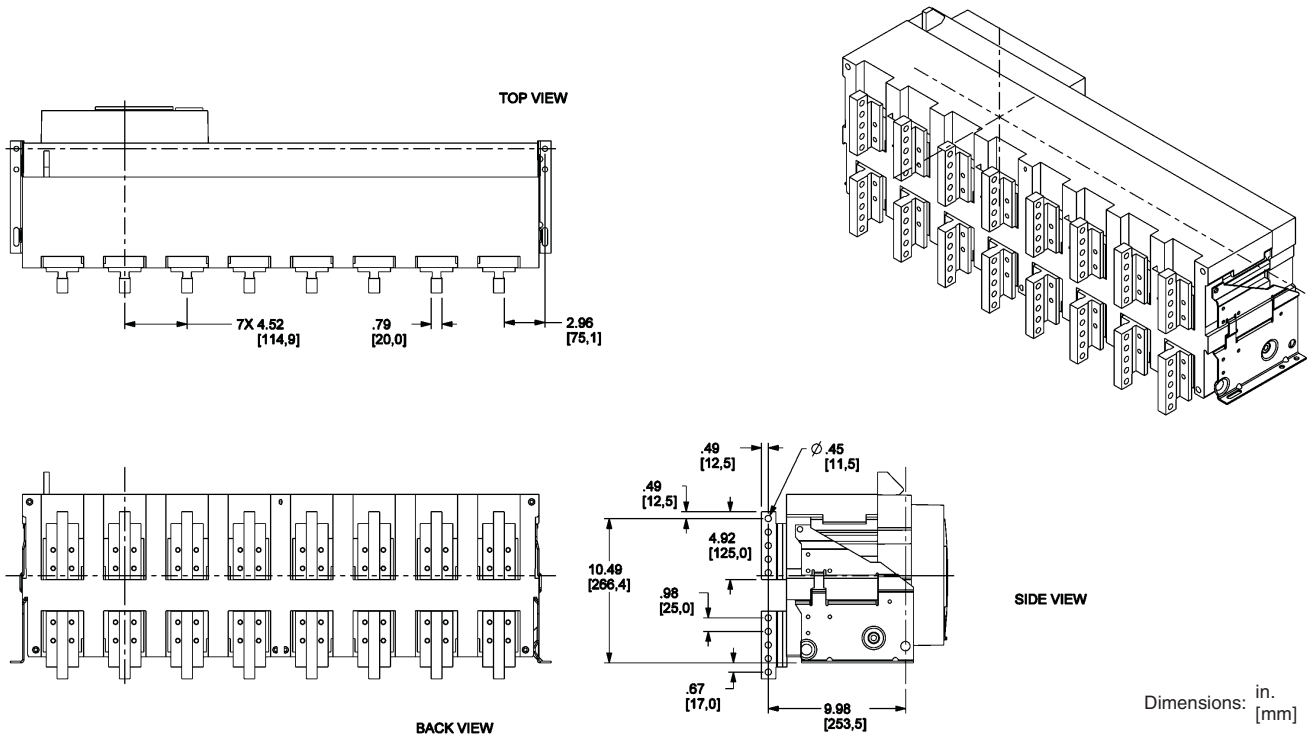
Figure 163: 6300 Rear-Connected "T" Vertical (RCTV)



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Section 7—Selection

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Introduction

Masterpact™ circuit breakers are available in three frame sizes:

- T-frame circuit breakers: rated up to 800 A (ANSI Certified), up to 1600 A (UL® Listed), and up to 1600 A (IEC Rated).
- W-frame circuit breakers: rated up to 4000 A (ANSI Certified), up to 3000 A (UL Listed), and up to 4000 A (IEC Rated).
- Y-frame circuit breakers: rated up to 5000 A (ANSI Certified), up to 6000 A (UL Listed), and up to 6300 A (IEC Rated).

Within each range, several sensor plugs are available to determine the maximum trip rating of each circuit breaker. In addition to a sensor plug, an adjustable rating plug is available to get lower ampacity than that available with the sensor plug.

Masterpact circuit breakers can be equipped with a variety of Micrologic™ electronic trip unit configurations, ranging from basic circuit protection to more advanced relay protection and power metering capabilities. Additionally all electronic trip units within the new Micrologic family are field interchangeable and upgradeable. Each control unit is also equipped with an interchangeable and upgradeable adjustable rating plug which is used to select the long-time pickup setting of the circuit breaker.

NOTE: Masterpact circuit breakers are ordered by sensor plug rating, not ampere trip rating. The trip rating of the circuit breaker is determined by the setting of the adjustable rating plug. Sensor plugs and rating plugs are field replaceable.

Overview of Selection Procedure

1. Select the completely assembled circuit breaker (circuit breaker frame plus trip unit):
   - The frame ampere rating required
   - The interrupting rating required
   - The sensor plug rating required
   - The connections
2. Select the trip unit, rating plug, and trip unit options.
3. Select circuit breaker frame options, if required.
4. Select cradle options, if required.

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Table 62: Circuit Breaker Selection Options

Model Number	NT				NW				NW		
Frame type	T				W				Y (wide-construction)		
Maximum frame rating	ANSI	UL	UL	IEC	ANSI	ANSI	UL	IEC	ANSI	UL	IEC
	800 A	1200 A	1600 A	1600 A	3200 A	4000 A	3000 A	4000 A	6000 A	6000 A	6300 A
Maximum Interrupting Rating (kA, 50/60 Hz)											
AC rating	254 V 42 kA	240 V 200 kA	240 V 200 kA	240 V 150 kA	254 V 200 kA	254 V 100 kA	240 V 200 kA	240 V 150 kA	254 V 200 kA	240 V 200 kA	240 V 150 kA
	508 V 42 kA	480 V 100 kA	480 V 100 kA	440 V 130 kA	508 V 200 kA	508 V 100 kA	480 V 150 kA	440 V 150 kA	508 V 200 kA	480 V 150 kA	440 V 150 kA
	635 V N/A	600 V 50 kA	600 V 50 kA	690 V 42 kA	635 V 130 kA	635 V 85 kA	600 V 100 kA	690 V 100 kA	635 V 130 kA	600 V 100 kA	690 V 100 kA
Construction											
Drawout	X	X	—	X	X	—	X	X	X	X	X
Fixed (UL Listed and IEC Rated only)	X	X	X	X	X	X	X	X	X	X	X
Termination											
Rotatable rear terminals	X	X	X	X	X	X	X	X	X	X	X
Front-connected terminals	X	X	X	X	X	X	X	X	X	X	X

Accessories Available for the Circuit Breaker and Cradle

• Shunt close	• Ready-to-close contact	• Door interlock
• Shunt trip	• Overcurrent trip switch (standard)	• Operations counter
• Undervoltage trip	• Rack in interlock	• Safety Shutter
• Fixed time delay	• Key locks for circuit breaker and cradle	• Cradle rejection kit (standard)
• Adjustable time delay	• Padlock attachment (circuit breaker plus cradle)	• Rail Padlocking
• Spring-charging motor	• Mechanical interlocks	
• Auxiliary contacts (standard)	• Cradle position switches	

Electronic Trip Unit Features

• True RMS sensing	• Trip indication LED	• Neutral protection
• LSI	• Zone-selective interlocking (ZSI)	• Contact wear indication
• Ground-fault alarm (no trip)	• Communications	• Incremental fine-tuning of settings
• Ground-fault trip	• LCD dot matrix display	• Selectable long-time delay bands
• Ground-fault trip and programmable alarm	• Advanced user interface	• Power measurement
• Adjustable rating plugs	• Protective relay functions	• Expanded memory
• Long-time pickup LED	• Thermal imaging	• Enhanced power quality measurement

Table 63: Micrologic Trip Unit Selection

Design Platform Designation	Feature Type	Protection	Model Number
Basic Trip Unit	Basic	LS0 (IEC Rated)	2.0
		LI (UL Listed/ANSI Certified)	3.0
		LSI	5.0
Trip Unit with Ammeter	A	LS0 (IEC Rated)	2.0A
		LI (UL Listed/ANSI Certified)	3.0A
		LSI	5.0A
		LSIG	6.0A
Trip Unit with Power Metering	P	LSI	5.0P
		LSIG	6.0P
Trip Unit with Harmonic Metering	H	LSI	5.0H
		LSIG	6.0H

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Factory-Assembled Circuit Breakers and Switches

T-Frame Circuit Breaker Selection

Table 64: ANSI C37 Certified/UL 1066 Listed T-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating			Sensor Plug Rating
		254 V	508 V	635 V	
800 A	NT08N1	42 kA	42 kA	—	100 A, 250 A, 400 A, 600 A, 800 A

Table 65: UL 489 Listed T-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating			Sensor Plug Rating
		240 V	480 V	600 V	
800 A	NT08N	50 kA	50 kA	35 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NT08H	65 kA	50 kA	50 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NT08L1[1]	100 kA	65 kA	—	100 A, 250 A, 400 A, 600 A, 800 A
	NT08L[1]	200 kA	100 kA	—	100 A, 250 A, 400 A, 600 A, 800 A
	NT08LF[1]	200 kA	100 kA	—	100 A, 250 A, 400 A, 600 A, 800 A
1200 A	NT12N	50 kA	50 kA	35 kA	600 A, 800 A, 1000 A, 1200 A
	NT12H	65 kA	50 kA	50 kA	600 A, 800 A, 1000 A, 1200 A
	NT12L1[1]	100 kA	65 kA	—	600 A, 800 A, 1000 A, 1200 A
	NT12L[1]	200 kA	100 kA	—	600 A, 800 A, 1000 A, 1200 A
	NT12LF[1]	200 kA	5100 kA	—	600 A, 800 A, 1000 A, 1200 A
1600 A[2]	NT16N	50 kA	50 kA	35 kA	800 A, 1000 A, 1200 A, 1600 A
	NT16H	65 kA	50 kA	50 kA	800 A, 1000 A, 1200 A, 1600 A
	NT16L1[1]	100 kA	65 kA	—	800 A, 1000 A, 1200 A, 1600 A
	NT16L[1]	200 kA	100 kA	—	800 A, 1000 A, 1200 A, 1600 A
	NT16LF[1]	200 kA	5100 kA	—	800 A, 1000 A, 1200 A, 1600 A

[1] Not available in 4P circuit breakers.

[2] Fixed-mount only. 1600A UL 489 drawout circuit breakers are not available.

Table 66: IEC 60947-2 Rated T-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating (kA)				Sensor Plug Rating (A)
		240 V	440 V	690 V	1000 V	
800 A	NT08H1	42 kA	42 kA	42 kA	—	250 A, 400 A, 630 A, 800 A
	NT08L1	150 kA	130 kA	25 kA	—	250 A, 400 A, 630 A, 800 A
1000 A	NT10H1	42 kA	42 kA	42 kA	—	400 A, 630 A, 800 A, 1000 A
	NT10L1	150 kA	130 kA	25 kA	—	400 A, 630 A, 800 A, 1000 A
1250 A	NT12H1	42 kA	42 kA	42 kA	—	630 A, 800 A, 1000 A, 1250 A
1600 A	NT16H1	42 kA	42 kA	42 kA	—	800 A, 1000 A, 1250 A, 1600 A

NOTE: L1F and LF circuit breakers are tested to show the arc flash hazard risk category as referenced by NFPA 70E.

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T-Frame Switch Selection

Table 67: ANSI C37 Certified/UL 1066 Listed, Non-Automatic T-Frame Switch

Frame Rating	Model Number	Interrupting Rating [1]			Short-Time (0.5 s) Rating
		254 V	508 V	635 V	
800 A	NT08NA	42 kA	42 kA	NA	42 kA
	NT08HA	42 kA	42 kA	22 kA	42 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

Table 68: UL 489 Listed, Automatic T-Frame Switches

Frame Rating	Model Number	Withstand Rating [1]			Instantaneous Override
		240 V	480 V	600 V	
800 A	NT08HF	65 kA	50 kA	50 kA	40 kA
	NT08HB[2]	200 kA	100 kA	N/A	10 kA
1200 A	NT12HF	65 kA	50 kA	50 kA	40 kA
	NT12HB[2]	200 kA	100 kA	N/A	10 kA
1600 A[3]	NT16HF	65 kA	50 kA	50 kA	40 kA
	NT16HB[2]	200 kA	100 kA	N/A	10 kA

1 The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

2 Not available in 4P circuit breakers.

3 Fixed-mount only. 1600A UL489 drawout switches are not available.

Table 69: IEC 60947-3 Rated, Non-Automatic T-Frame Switches

Frame Rating	Model Number	Interrupting Rating [1]				Short-Time (0.5 s) Rating
		240 V	440 V	690 V	1000 V	
800 A	NT08HA	42 kA	42 kA	42 kA	—	42 kA
1000 A	NT10HA	42 kA	42 kA	42 kA	—	42 kA
1250 A	NT12HA	42 kA	42 kA	42 kA	—	42 kA
1600 A	NT16HA	42 kA	42 kA	42 kA	—	42 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

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W-Frame Circuit Breaker Selection

Table 70: ANSI C37/UL 1066 Listed W-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating			Sensor Plug Rating
		254 V	508 V	635 V	
800 A	NW08N1	42 kA	42 kA	42 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NW08H1	65 kA	65 kA	65 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NW08H2	85 kA	85 kA	85 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NW08H3	100 kA	100 kA	85 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NW08L1[1]	200 kA	200 kA	130 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NW08L1F[1]	200 kA	200 kA	130 kA	100 A, 250 A, 400 A, 600 A, 800 A
1600 A	NW16N1	42 kA	42 kA	42 kA	800 A, 1000 A, 1200 A, 1600 A
	NW16H1	65 kA	65 kA	65 kA	800 A, 1000 A, 1200 A, 1600 A
	NW16H2	85 kA	85 kA	85 kA	800 A, 1000 A, 1200 A, 1600 A
	NW16H3	100 kA	100 kA	85 kA	800 A, 1000 A, 1200 A, 1600 A
	NW16L1[1]	200 kA	200 kA	130 kA	800 A, 1000 A, 1200 A, 1600 A
	NW16L1F[1]	200 kA	200 kA	130 kA	800 A, 1000 A, 1200 A, 1600 A
2000 A	NW20H1	65 kA	65 kA	65 kA	1000 A, 1200 A, 1600 A, 2000 A
	NW20H2	85 kA	85 kA	85 kA	1000 A, 1200 A, 1600 A, 2000 A
	NW20H3	100 kA	100 kA	85 kA	1000 A, 1200 A, 1600 A, 2000 A
	NW20L1[1]	100 kA	200 kA	130 kA	1000 A, 1200 A, 1600 A, 2000 A
	NW20L1F[1]	200 kA	200 kA	130 kA	1000 A, 1200 A, 1600 A, 2000 A
3200 A	NW32H1	65 kA	65 kA	65 kA	1600 A, 2000 A, 2500 A, 3000 A, 3200 A
	NW32H2	85 kA	85 kA	85 kA	1600 A, 2000 A, 2500 A, 3000 A, 3200 A
	NW32H3	100 kA	100 kA	85 kA	1600 A, 2000 A, 2500 A, 3000 A, 3200 A
4000 A (W-Frame)	NW40BH1	65 kA	65 kA	65 kA	2000 A, 2500 A, 3000 A, 3200 A, 3600 A, 4000 A
	NW40BH2	85 kA	85 kA	85 kA	2000 A, 2500 A, 3000 A, 3200 A, 3600 A, 4000 A
	NW40BH3	100 kA	100 kA	85 kA	2000 A, 2500 A, 3000 A, 3200 A, 3600 A, 4000 A

[1] Not available for fixed-mounted or 4P circuit breakers.

NOTE: L1F circuit breakers are tested to show the arc flash hazard risk category as referenced by NFPA 70E.

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Table 71: UL 489 Listed W-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating			Sensor Plug Rating
		240 V	480 V	600 V	
800 A	NW08N	65 kA	65 kA	50 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NW08H	100 kA	100 kA	85 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NW08L[1]	200 kA	150 kA	100 kA	100 A, 250 A, 400 A, 600 A, 800 A
	NW08LF[1]	200 kA	150 kA	100 kA	100 A, 250 A, 400 A, 600 A, 800 A
1200 A	NW12N	65 kA	65 kA	50 kA	600 A, 800 A, 1000 A, 1200 A
	NW12H	100 kA	100 kA	85 kA	600 A, 800 A, 1000 A, 1200 A
	NW12L[1]	200 kA	150 kA	100 kA	600 A, 800 A, 1000 A, 1200 A
	NW12LF[1]	200 kA	150 kA	100 kA	600 A, 800 A, 1000 A, 1200 A
1600 A	NW16N	65 kA	65 kA	50 kA	800 A, 1000 A, 1200 A, 1600 A
	NW16H	100 kA	100 kA	85 kA	800 A, 1000 A, 1200 A, 1600 A
	NW16L[1]	200 kA	150 kA	100 kA	800 A, 1000 A, 1200 A, 1600 A
	NW16LF[1]	200 kA	150 kA	100 kA	800 A, 1000 A, 1200 A, 1600 A
2000 A	NW20N	65 kA	65 kA	50 kA	1000 A, 1200 A, 1600 A, 2000 A
	NW20H	100 kA	100 kA	85 kA	1000 A, 1200 A, 1600 A, 2000 A
	NW20L[1]	200 kA	150 kA	100 kA	1000 A, 1200 A, 1600 A, 2000 A
	NW20LF[1]	200 kA	150 kA	100 kA	1000 A, 1200 A, 1600 A, 2000 A
2500 A	NW25H	100 kA	100 kA	85 kA	1200 A, 1600 A, 2000 A, 2500 A
	NW25L[1]	200 kA	150 kA	100 kA	1200 A, 1600 A, 2000 A, 2500 A
3000 A	NW30H	100 kA	100 kA	85 kA	1600 A, 2000 A, 2500 A, 3000 A
	NW30L[1]	200 kA	150 kA	100 kA	1600 A, 2000 A, 2500 A, 3000 A

[1] Not available for fixed-mounted or 4P drawout circuit breakers.

NOTE: LF circuit breakers are tested to show the arc flash hazard risk category as referenced by NFPA 70E.

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Table 72: IEC 60947-2 Rated W-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating				Sensor Plug Rating
		240 V	440 V	690 V	1150 V	
800 A	NW08N1	42 kA	42 kA	42 kA	—	400 A, 630 A, 800 A
	NW08H1	65 kA	65 kA	65 kA	—	400 A, 630 A, 800 A
	NW08H2	100 kA	100 kA	85 kA	—	400 A, 630 A, 800 A
	NW08L1[1]	150 kA	150 kA	100 kA	—	400 A, 630 A, 800 A
	NW08H10[1]	—	—	—	50 kA	400 A, 630 A, 800 A
1000 A	NW10N1	42 kA	42 kA	42 kA	—	400 A, 630 A, 800 A, 1000 A
	NW10H1	65 kA	65 kA	65 kA	—	400 A, 630 A, 800 A, 1000 A
	NW10H2	100 kA	100 kA	85 kA	—	400 A, 630 A, 800 A, 1000 A
	NW10L1[1]	150 kA	150 kA	100 kA	—	400 A, 630 A, 800 A, 1000 A
	NW10H10[1]	—	—	—	50 kA	400 A, 630 A, 800 A, 1000 A
1250 A	NW12N1	42 kA	42 kA	42 kA	—	630 A, 800 A, 1000, A1250 A
	NW12H1	65 kA	65 kA	65 kA	—	630 A, 800 A, 1000 A, 1250 A
	NW12H2	100 kA	100 kA	85 kA	—	630 A, 800 A, 1000 A, 1250 A
	NW12L1[1]	150 kA	150 kA	100 kA	—	630 A, 800 A, 1000 A, 1250 A
	NW12H10[1]	—	—	—	50 kA	630 A, 800 A, 1000 A, 1250 A
1600 A	NW16N1	42 kA	42 kA	42 kA	—	800 A, 1000 A, 1250 A, 1600 A
	NW16H1	65 kA	65 kA	65 kA	—	800 A, 1000 A, 1250 A, 1600 A
	NW16H2	100 kA	100 kA	85 kA	—	800 A, 1000 A, 1250 A, 1600 A
	NW16L1[1]	150 kA	150 kA	100 kA	—	800 A, 1000 A, 1250 A, 1600 A
	NW16H10[1]	—	—	—	50 kA	800 A, 1000 A, 1250 A, 1600 A
2000 A	NW20H1	65 kA	65 kA	65 kA	—	1000 A, 1250 A, 1600 A, 2000 A
	NW20H2	100 kA	100 kA	85 kA	—	1000 A, 1250 A, 1600 A, 2000 A
	NW20H3 [1]	150 kA	150 kA	100 kA	—	1000 A, 1250 A, 1600 A, 2000 A
	NW20L1[1]	150 kA	150 kA	100 kA	—	1000 A, 1250 A, 1600 A, 2000 A
	NW20H10[1]	—	—	—	50 kA	1000 A, 1250 A, 1600 A, 2000 A
2500 A	NW25H1	65 kA	65 kA	65	—	1250 A, 1600 A, 2000 A, 2500 A
	NW25H2	100 kA	100 kA	85	—	1250 A, 1600 A, 2000 A, 2500 A
	NW25H3[1]	150 kA	150 kA	100	—	1250 A, 1600 A, 2000 A, 2500 A
	NW25H10[1]	—	—	—	50 kA	1250 A, 1600 A, 2000 A, 2500 A
3200 A	NW32H1	65 kA	65 kA	65 kA	—	1600 A, 2000 A, 2500 A, 3200 A
	NW32H2	100 kA	100 kA	85 kA	—	1600 A, 2000 A, 2500 A, 3200 A
	NW32H3[1]	150 kA	150 kA	100 kA	—	1600 A, 2000 A, 2500 A, 3200 A
	NW32H10[1]	—	—	—	50 kA	1600 A, 2000 A, 2500 A, 3200 A
4000 A	NW40H1	65 kA	65 kA	65 kA	—	2000 A, 2500 A, 3200 A, 4000 A
	NW40H2	100 kA	100 kA	85 kA	—	2000 A, 2500 A, 3200 A, 4000 A
	NW40H3[1]	150 kA	150 kA	100 kA	—	2000 A, 2500 A, 3200 A, 4000 A
	NW40H10[1]	—	—	—	50 kA	2000 A, 2500 A, 3200 A, 4000 A

[1] Not available for fixed-mounted circuit breakers.

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W-Frame Switch Selection

Table 73: ANSI C37 Certified/UL 1066 Listed, Non-Automatic Switch

Frame Rating	Model Number	Interrupting Rating [1]			Short-Time (0.5 s) Rating
		254 V	508 V	635 V	
800 A	NW08HA	65 kA	65 kA	65 kA	65 kA
1600 A	NW16HA	65 kA	65 kA	65 kA	65 kA
2000 A	NW20HA	65 kA	65 kA	65 kA	65 kA
3200 A	NW32HA	65 kA	65 kA	65 kA	65 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

Table 74: ANSI C37 Certified/UL 1066 Listed, Drawout Automatic Switch

Frame Rating (W-Frame)	Model Number	Interrupting Rating [1]			Short-Time (0.5 s) Rating
		254 V	508 V	635 V	
800 A	NW08HF	100 kA	100 kA	85 kA	85 kA
	NW08HC[2]	200 kA	200 kA	130 kA	30 kA
1600 A	NW16HF	100 kA	100 kA	85 kA	85 kA
	NW16HC[2]	200 kA	200 kA	130 kA	30 kA
2000 A	NW20HF	100 kA	100 kA	85 kA	85 kA
	NW20HC[2]	200 kA	200 kA	130 kA	30 kA
3200 A	NW32HF	100 kA	100 kA	85 kA	85 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

2 Not available in 4P.

Table 75: ANSI C37 Certified/UL 1066 Listed, Fixed Automatic Switch

Frame Rating (W-Frame)	Model Number	Interrupting Rating [1]			Short-Time (0.5 s) Rating
		254 V	508 V	635 V	
800 A	NW08HF	100 kA	100 kA	85 kA	85 kA
1600 A	NW16HF	100 kA	100 kA	85 kA	85 kA
2000 A	NW20HF	100 kA	100 kA	85 kA	85 kA
3200 A	NW32HF	100 kA	100 kA	85 kA	85 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

Table 76: UL 489 Listed, Fixed Automatic Switch

Frame Rating	Model Number	Withstand Rating [1]			Instantaneous Override
		240 V	480 V	600 V	
800 A	NW08HF	100 kA	100 kA	85 kA	40 kA
1200 A	NW12HF	100 kA	100 kA	85 kA	40 kA
1600 A	NW16HF	100 kA	100 kA	85 kA	40 kA
2000 A	NW20HF	100 kA	100 kA	85 kA	40 kA
2500 A	NW25HF	100 kA	100 kA	85 kA	65 kA
3000 A	NW30HF	100 kA	100 kA	85 kA	65 kA

1 The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

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Table 77: UL 489 Listed, Drawout Automatic Switch

Frame Rating	Model Number	Withstand Rating [1]			Instantaneous Override
		240 V	480 V	600 V	
800 A	NW08HF	100 kA	100 kA	85 kA	40 kA
	NW08HB[2]	200 kA	150 kA	100 kA	35 kA
1200 A	NW12HF	100 kA	100 kA	85 kA	40 kA
	NW12HB[2]	200 kA	150 kA	100 kA	35 kA
1600 A	NW16HF	100 kA	100 kA	85 kA	40 kA
	NW16HB[2]	200 kA	150 kA	100 kA	35 kA
2000 A	NW20HF	100 kA	100 kA	85 kA	40 kA
	NW20HB[2]	200 kA	150 kA	100 kA	35 kA
2500 A	NW25HF	100 kA	100 kA	85 kA	65 kA
	NW25HB[2]	200 kA	150 kA	100 kA	65 kA
3000 A	NW30HF	100 kA	100 kA	85 kA	65 kA
	NW30HB[2]	200 kA	150 kA	100 kA	65 kA

1 The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

2 Not available in 4P.

Table 78: IEC 60947-3 Rated, Automatic Switch

Frame Rating	Model Number	Withstand Rating [1]			Instantaneous Override
		240 V	440 V	690 V	
800 A	NW08HF	85 kA	85 kA	85 kA	85 kA
1000 A	NW10HF	85 kA	85 kA	85 kA	85 kA
1250 A	NW12HF	85 kA	85 kA	85 kA	85 kA
1600 A	NW16HF	85 kA	85 kA	85 kA	85 kA
2000 A	NW20HF	85 kA	85 kA	85 kA	85 kA
2500 A	NW25HF	85 kA	85 kA	85 kA	85 kA
3200 A	NW32HF	85 kA	85 kA	85 kA	85 kA
4000 A	NW40HF	85 kA	85 kA	85 kA	85 kA

1 The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

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Table 79: IEC 60947-3 Rated, Non-Automatic Switch

Frame Rating	Model Number	Interrupting Rating [1]				Short-Time (0.5 s) Rating
		240 V	440 V	690 V	1150 V	
800 A	NW08NA	42 kA	42 kA	42 kA	—	42 kA
	NW08HA	50 kA	50 kA	50 kA	—	50 kA
	NW08HA10[2]	—	—	—	50 kA	50 kA
1000 A	NW10NA	42 kA	42 kA	42 kA	—	42 kA
	NW10HA	50 kA	50 kA	50 kA	—	50 kA
	NW10HA10[2]	—	—	—	50 kA	50 kA
1250 A	NW12NA	42 kA	42 kA	42 kA	—	42 kA
	NW12HA	50 kA	50 kA	50 kA	—	50 kA
	NW12HA10[2]	—	—	—	50 kA	50 kA
1600 A	NW16NA	42 kA	42 kA	42 kA	—	42 kA
	NW16HA	50 kA	50 kA	50 kA	—	50 kA
	NW16HA10[2]	—	—	—	50 kA	50 kA
2000 A	NW20HA	50 kA	50 kA	50 kA	—	50 kA
	NW20HA10[2]	—	—	—	50 kA	50 kA
2500 A	NW25HA	50 kA	50 kA	50 kA	—	50 kA
	NW25HA10[2]	—	—	—	50 kA	50 kA
3200 A	NW32HA	50 kA	50 kA	50 kA	—	50 kA
	NW32HA10[2]	—	—	—	50 kA	50 kA
4000 A	NW40HA	50 kA	50 kA	50 kA	—	50 kA
	NW40HA10[2]	—	—	—	50 kA	50 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

2 Not available for fixed-mounted circuit breakers.

Y-Frame Circuit Breaker Selection

Table 80: ANSI C37 Certified/UL 1066 Listed Y-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating (kA)			Sensor Plug Rating (A)
		254 V	508 V	635 V	
3200 A to 4000 A	NW32L1[1]	200 kA	200 kA	130 kA	2000 A, 2500 A, 3000 A, 3200 A
	NW40H2	85 kA	85 kA	85 kA	2000 A, 2500 A, 3000 A, 3200 A, 4000 A
	NW40H3	100 kA	100 kA	85 kA	2000 A, 2500 A, 3000 A, 3200 A, 4000 A
	NW40L1[1]	200 kA	200 kA	130 kA	2000 A, 2500 A, 3000 A, 3200 A, 4000 A
5000 A	NW50H2	85 kA	85 kA	85 kA	2500 A, 3000 A, 3200 A, 4000 A, 5000 A
	NW50H3	100 kA	100 kA	85 kA	2500 A, 3000 A, 3200 A, 4000 A, 5000 A
	NW50L1[1]	200 kA	200 kA	130 kA	2500 A, 3000 A, 3200 A, 4000 A, 5000 A

1 Not available for fixed-mounted or 4P drawout circuit breakers.

Table 81: UL 489 Listed Y-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating			Sensor Plug Rating
		240 V	480 V	600 V	
4000 A	NW40H	100 kA	100 kA	85 kA	2000 A, 2500 A, 3000 A, 4000 A
	NW40L[1]	200 kA	150 kA	100 kA	2000 A, 2500 A, 3000 A, 4000 A
5000 A	NW50H	100 kA	100 kA	85 kA	2500 A, 3000 A, 4000 A, 5000 A
	NW50L[1]	200 kA	150 kA	100 kA	2500 A, 3000 A, 4000 A, 5000 A
6000 A	NW60H	100 kA	100 kA	85 kA	3000 A, 4000 A, 5000 A, 6000 A
	NW60L[1]	200 kA	150 kA	100 kA	3000 A, 4000 A, 5000 A, 6000 A

1 Not available for fixed-mounted or 4P drawout circuit breakers.

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Table 82: IEC 60947-2 Rated Y-Frame Circuit Breakers

Frame Rating	Model Number	Interrupting Rating			Sensor Plug Rating
		240 V	440 V	690 V	
4000 A	NW40BH1	100 kA	100 kA	100 kA	2000 A, 2500 A, 3200 A, 4000 A
	NW40BH2	150 kA	150 kA	100 kA	2000 A, 2500 A, 3200 A, 4000 A
5000 A	NW50H1	100 kA	100 kA	100 kA	2500 A, 3200 A, 4000 A, 5000 A
	NW50H2	150 kA	150 kA	100 kA	2500 A, 3200 A, 4000 A, 5000 A
6300 A	NW63H1	100 kA	100 kA	100 kA	3200 A, 4000 A, 5000 A, 6300 A
	NW63H2	150 kA	150 kA	100 kA	3200 A, 4000 A, 5000 A, 6300 A

Y-Frame Switch Selection

Table 83: ANSI C37 Certified/UL 1066 Listed, Non-Automatic Switches

Frame Rating	Model Number	Interrupting Rating (kA)[1]			Short-Time (0.5 s) Rating
		254 V	508 V	635 V	
4000 A	NW40HA	85 kA	85 kA	85 kA	85 kA
5000 A	NW50HA	85 kA	85 kA	85 kA	85 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

Table 84: ANSI C37 Certified/UL 1066 Listed, Drawout Automatic Switches

Frame Rating (Y-Frame)	Model Number	Interrupting Rating [1]			Short-Time (0.5 s) Rating
		254 V	508 V	635 V	
3200 A	NW32HC[2]	200 kA	200 kA	130 kA	100 kA
4000 A	NW40HF	100 kA	100 kA	85 kA	85 kA
	NW40HC[2]	200 kA	200 kA	130 kA	100 kA
5000 A	NW50HF	100 kA	100 kA	85 kA	85 kA
	NW50HC[2]	200 kA	200 kA	130 kA	100 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

2 Not available in 4P.

Table 85: ANSI C37 Certified/UL 1066 Listed, Fixed Automatic Switches

Frame Rating (Y-Frame)	Model Number	Interrupting Rating [1]			Short-Time (0.5 s) Rating
		254 V	508 V	635 V	
4000 A	NW40HF	100 kA	100 kA	85 kA	85 kA
5000 A	NW50HF	100 kA	100 kA	85 kA	85 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

Table 86: UL 489 Listed, Fixed Automatic Switches

Frame Rating	Model Number	Withstand Rating [1]			Instantaneous Override
		240 V	480 V	600 V	
4000 A	NW40HF	100 kA	100 kA	85 kA	75 kA
5000 A	NW50HF	100 kA	100 kA	85 kA	75 kA
6000 A	NW60HF	100 kA	100 kA	85 kA	75 kA

1 The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

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Table 87: UL 489 Listed, Drawout Automatic Switches

Frame Rating	Model Number	Withstand Rating[1]			Instantaneous Override
		240 V	480 V	600 V	
4000 A	NW40HF	100 kA	100 kA	85 kA	75 kA
	NW40HB[2]	1200 kA	150 kA	100 kA	75 kA
5000 A	NW50HF	100 kA	100 kA	85 kA	75 kA
	NW50HB[2]	200 kA	150 kA	100 kA	75 kA
6000 A	NW60HF	100 kA	100 kA	85 kA	75 kA
	NW60HB[2]	200 kA	150 kA	100 kA	75 kA

1 The withstand rating is the fault current (at rated voltage) that the switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.

2 Not available in 4P.

Table 88: IEC 60947-3 Rated, Non-Automatic Switches

Frame Rating	Model Number	Interrupting Rating [1]			Short-Time (0.5 s) Rating
		240 V	440 V	690 V	
4000 A	NW40BHA	85 kA	85 kA	85 kA	85 kA
5000 A	NW50HA	85 kA	85 kA	85 kA	85 kA
6300 A	NW63HA	85 kA	85 kA	85 kA	85 kA

1 When used in conjunction with an overcurrent relay, circuit breaker, or fuse.

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Section 8—Trip Curves

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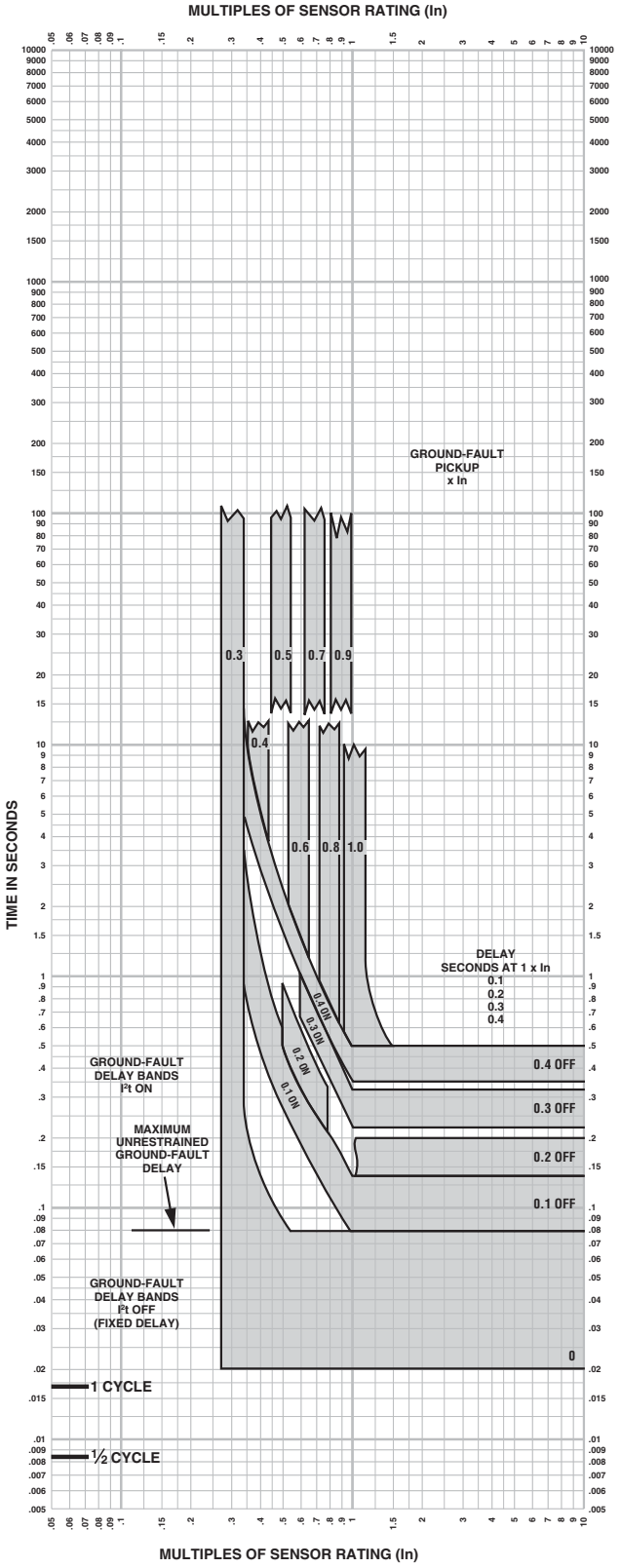
Micrologic™ 6.0 A/P/H Trip Units

Figure 164: Micrologic 6.0 A/P/H Trip Units: $I_n \leq$ 400 A



Curve No. 0613TC0001
Drawing No. B48095-613-01

Micrologic 6.0 A/P/H Trip Units with Adjustable Ground-Fault Pickup and Delay

Characteristic Trip Curve No. 613-1

Ground Fault I^2t OFF and ON

$I_n \leq$ 400 A

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

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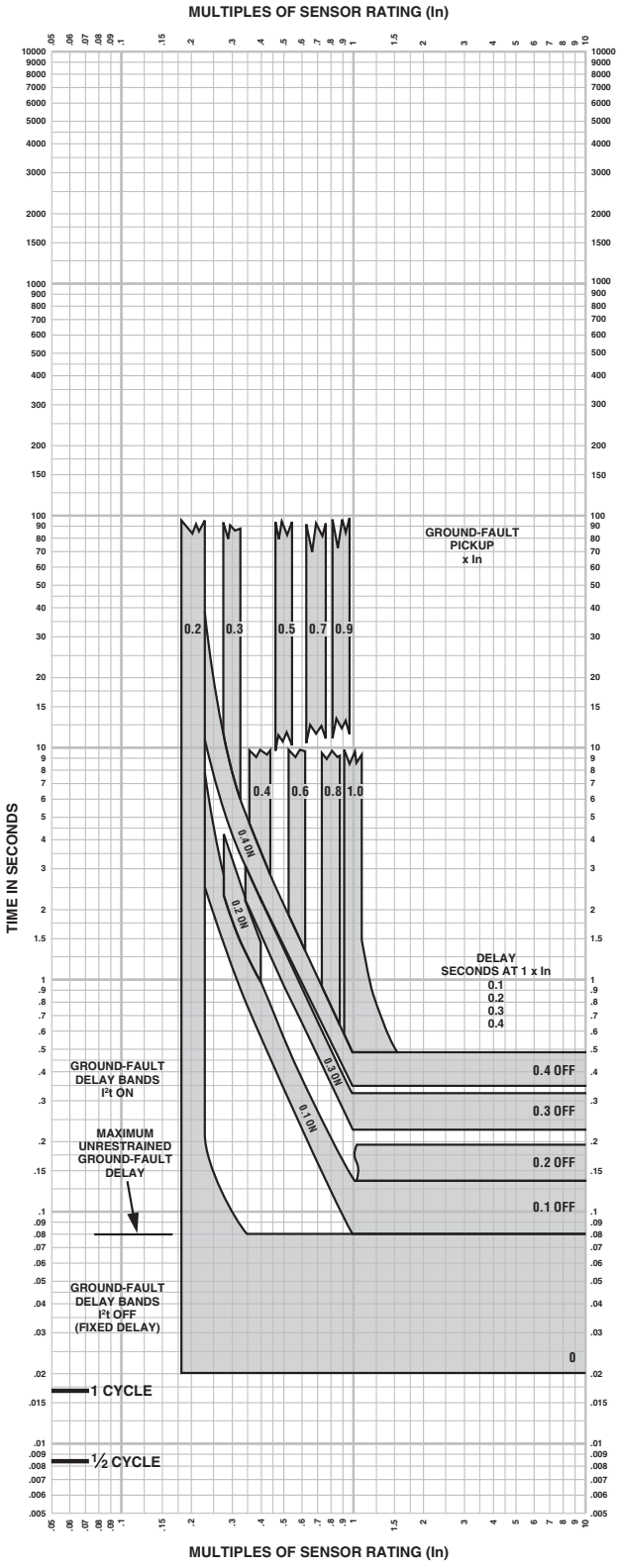
Figure 165: Micrologic 6.0 A/P/H Trip Units: 400 A < $I_n \leq$ 1200 A



Micrologic 6.0 A/P/H Trip Units with Adjustable Ground-Fault Pickup and Delay

Characteristic Trip Curve No. 613-2

Ground Fault I^2t OFF and ON

400 A < $I_n \leq$ 1200 A

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

Curve No. 0613TC0002
Drawing No. B48095-613-02

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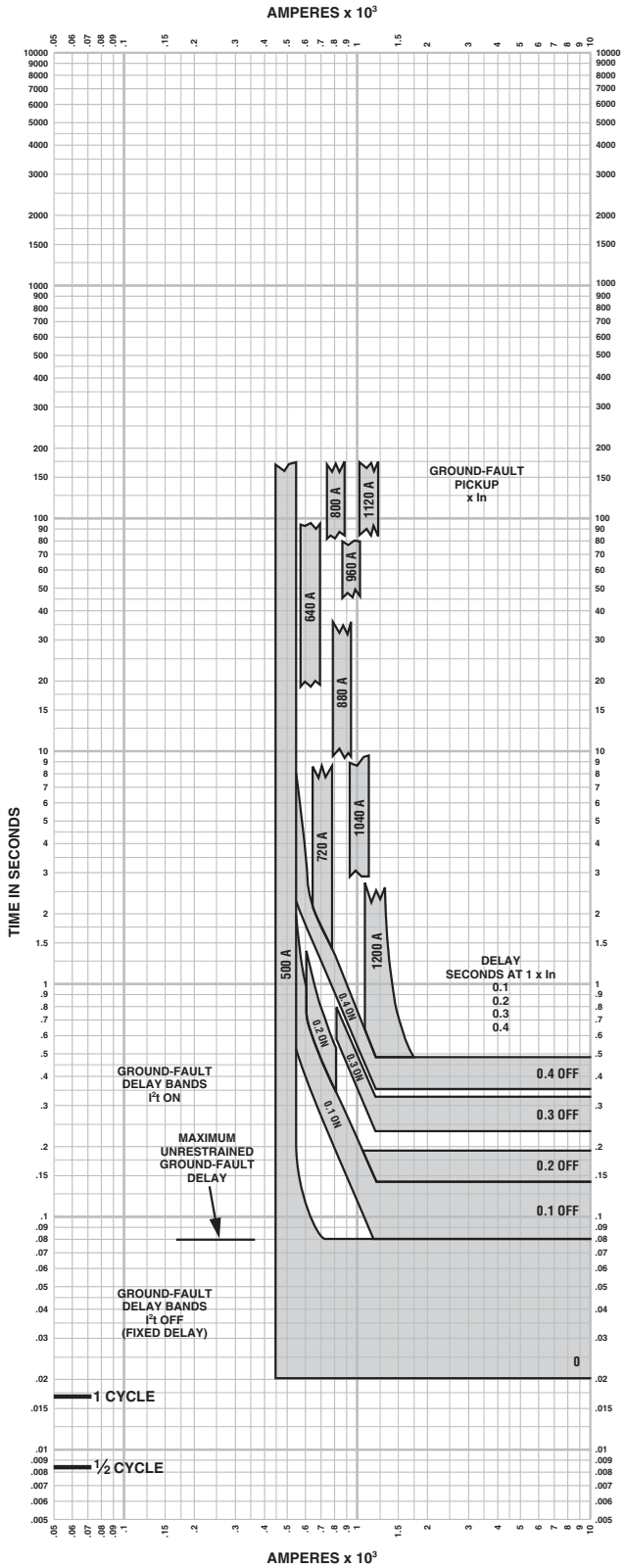
Figure 166: Micrologic 6.0 A/P/H Trip Units: I_n > 1200 A



Micrologic 6.0 A/P/H Trip Units with Adjustable Ground-Fault Pickup and Delay

Characteristic Trip Curve No. 613-3

Ground Fault I^2t OFF and ON

I_n > 1200 A

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

Curve No. 0613TC0003
Drawing No. B48095-613-03

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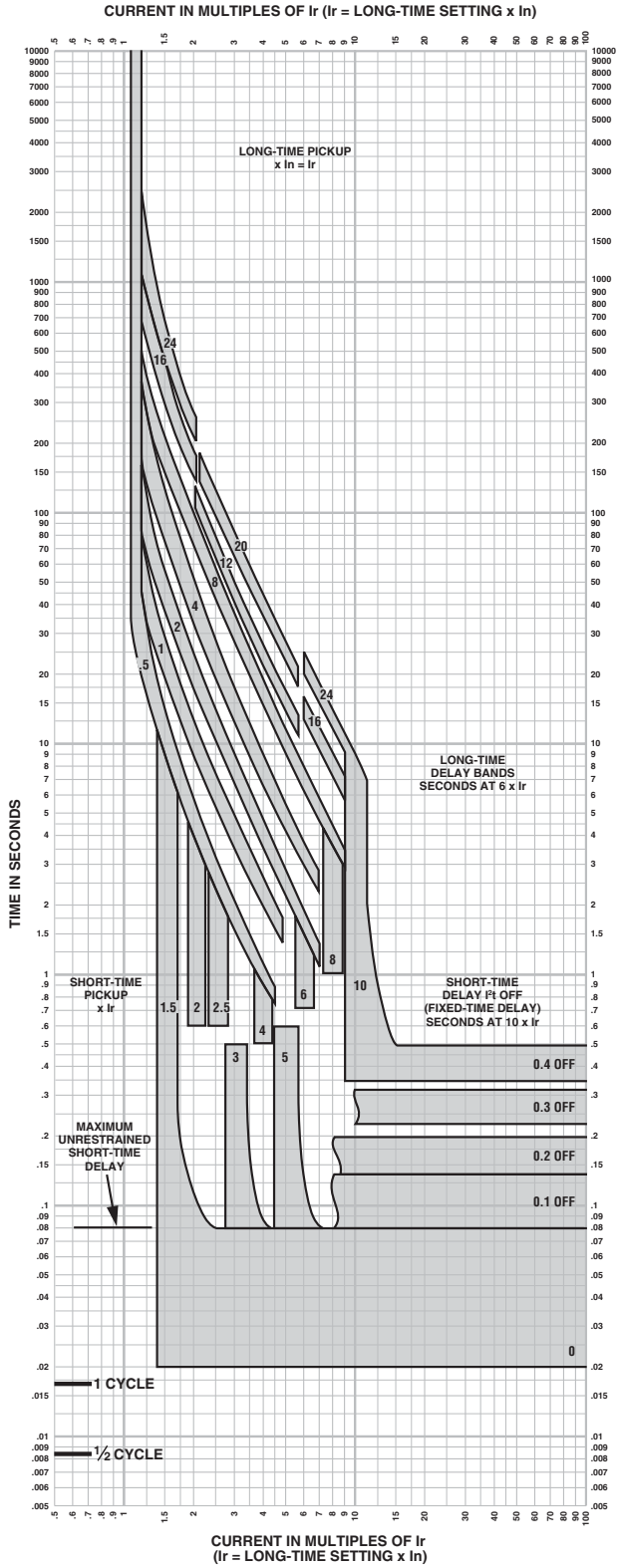
Micrologic 5.0/6.0 A/P/H Trip Unit

Figure 167: Micrologic 5.0/6.0 A/P/H Trip Units: Long-Time Pickup and Delay, Short-Time Pickup, and I^2t OFF Delay



Curve No. 0613TC0004
Drawing No. B48095-613-04

Micrologic 5.0/6.0 A/P/H Trip Units

Characteristic Trip Curve No. 613-4

Long-Time Pickup and Delay
Short-Time Pickup and I^2t OFF Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

NOTE:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

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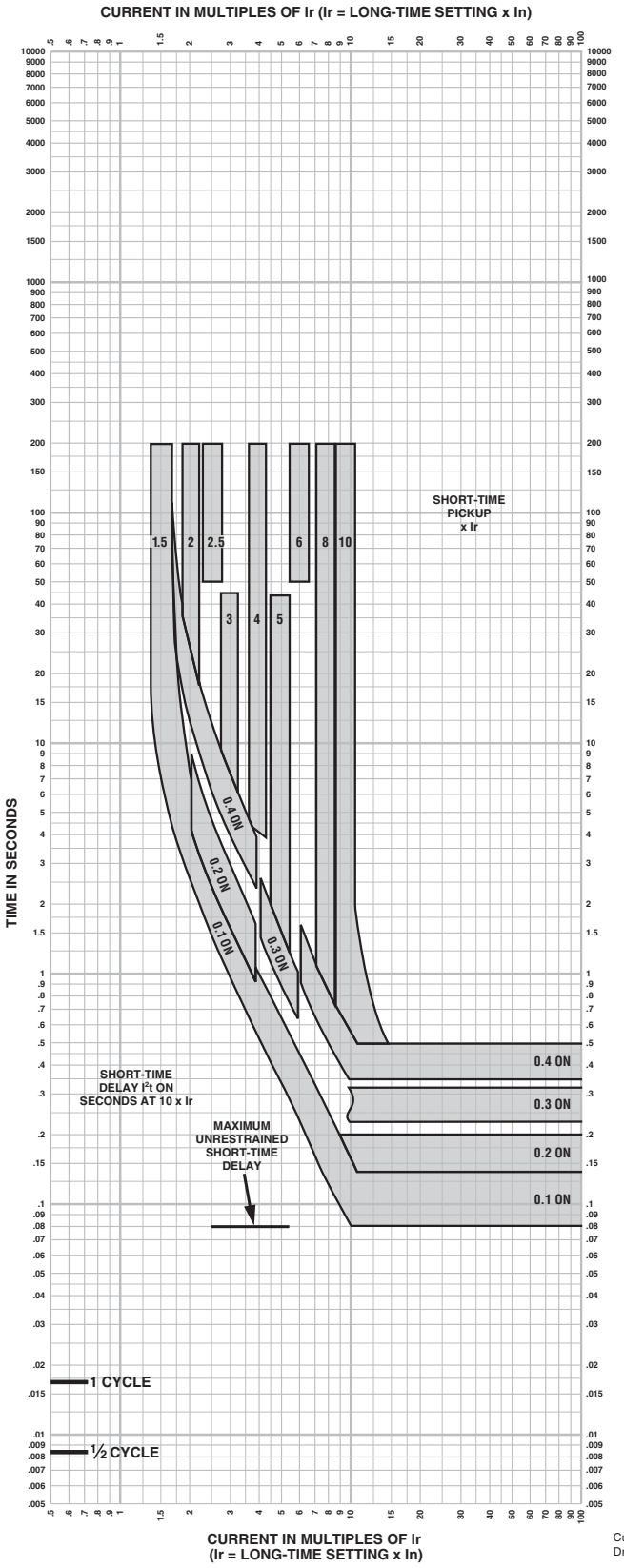
Figure 168: Micrologic 5.0/6.0 A/P/H Trip Units: Short-Time Pickup and I^2t ON Delay



Curve No. 0613TC0005
Drawing No. B48095-613-05

Micrologic 5.0/6.0 A/P/H Trip Units

Characteristic Trip Curve No. 613-5

Short-Time Pickup and I^2t ON Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

NOTE:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
5. For withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
6. See trip curve 613-4 for long-time pickup and delay trip curve.

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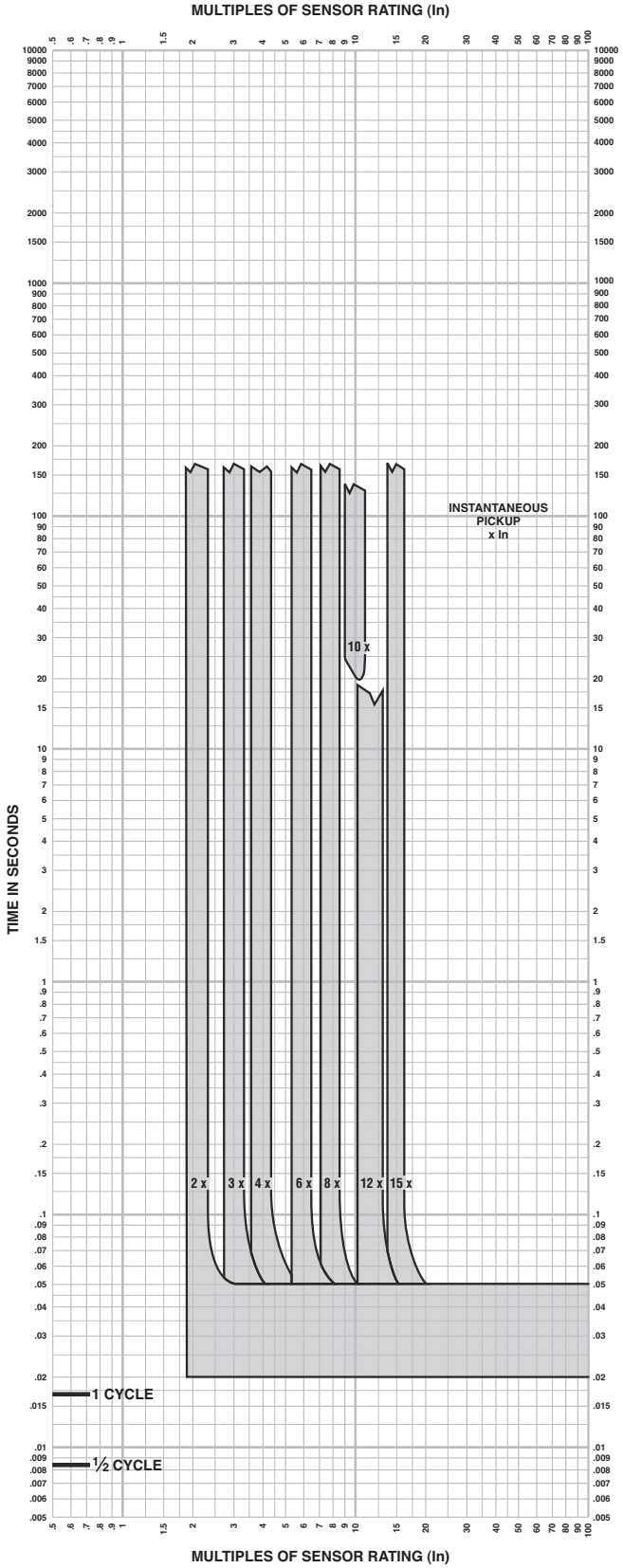
Figure 169: Micrologic 5.0/6.0 Trip Units: Instantaneous Pickup, 2x to 15x and OFF



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-7

Instantaneous Pickup
2x–15x and OFF

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
5. See 613-4 and 613-5 for long-time pickup, long-time delay, short-time pickup, and short-time delay trip curves.

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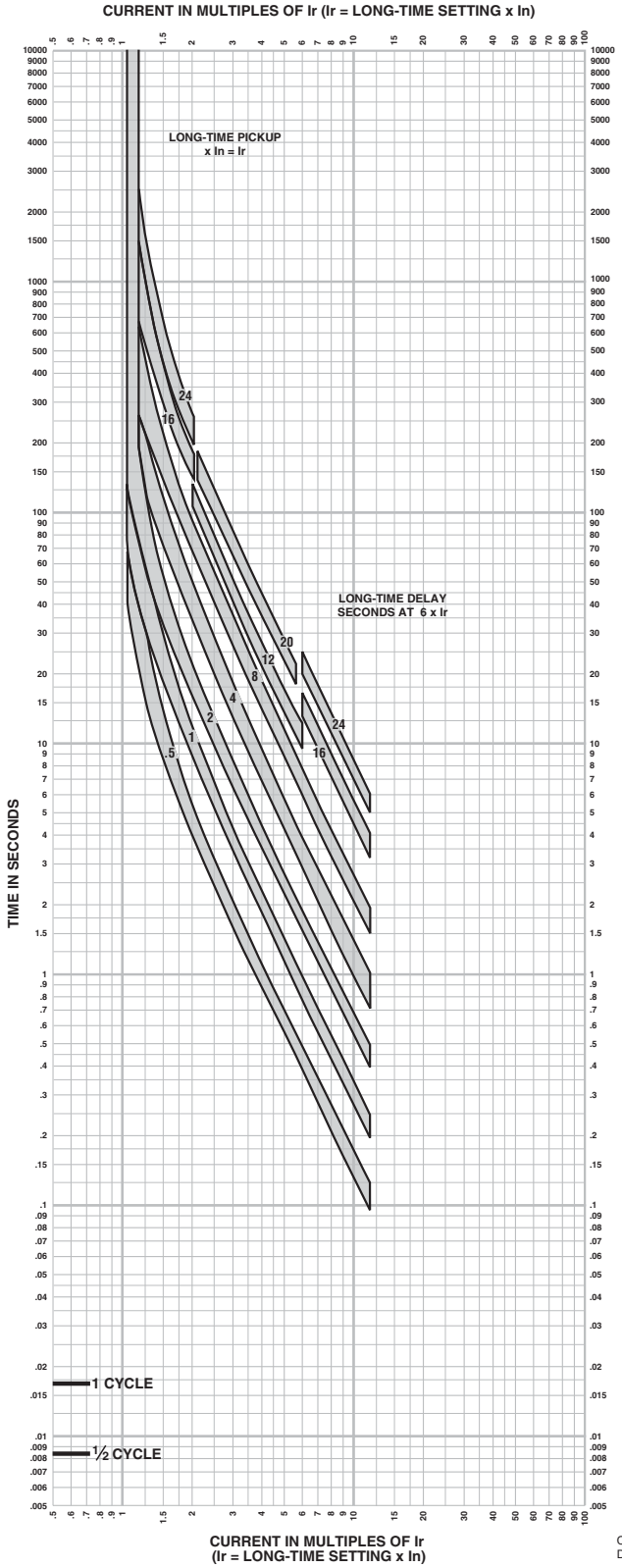
Micrologic 3.0 Trip Units

Figure 170: Micrologic 3.0A Trip Unit: Long-Time Pickup and Delay



Curve No. 0613TC0006
Drawing No. B48095-613-06

Micrologic 3.0A Trip Unit

Characteristic Trip Curve No. 613-6

Long-Time Pickup and Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

NOTE:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the instantaneous setting of the circuit breaker.
3. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
4. See trip curve 613-8 for instantaneous pickup trip curve.

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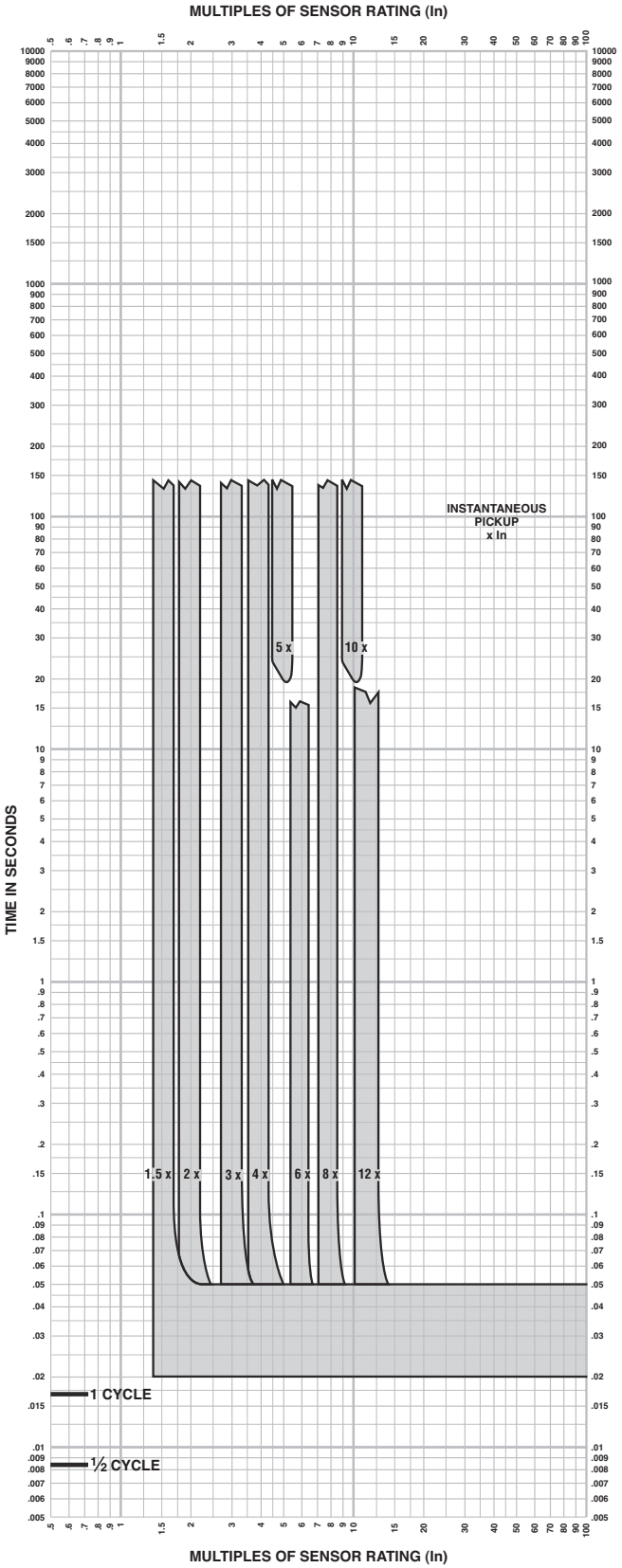
Figure 171: Micrologic 3.0A Trip Unit: Instantaneous Pickup, 1.5X to 12X



MICROLOGIC® 3.0 A TRIP UNIT
CHARACTERISTIC TRIP CURVE NO. 613-8

Instantaneous Pickup
1.5x-12x

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

Instantaneous override values are given on 613-10.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. See 613-6 for long-time pickup and delay trip curves.

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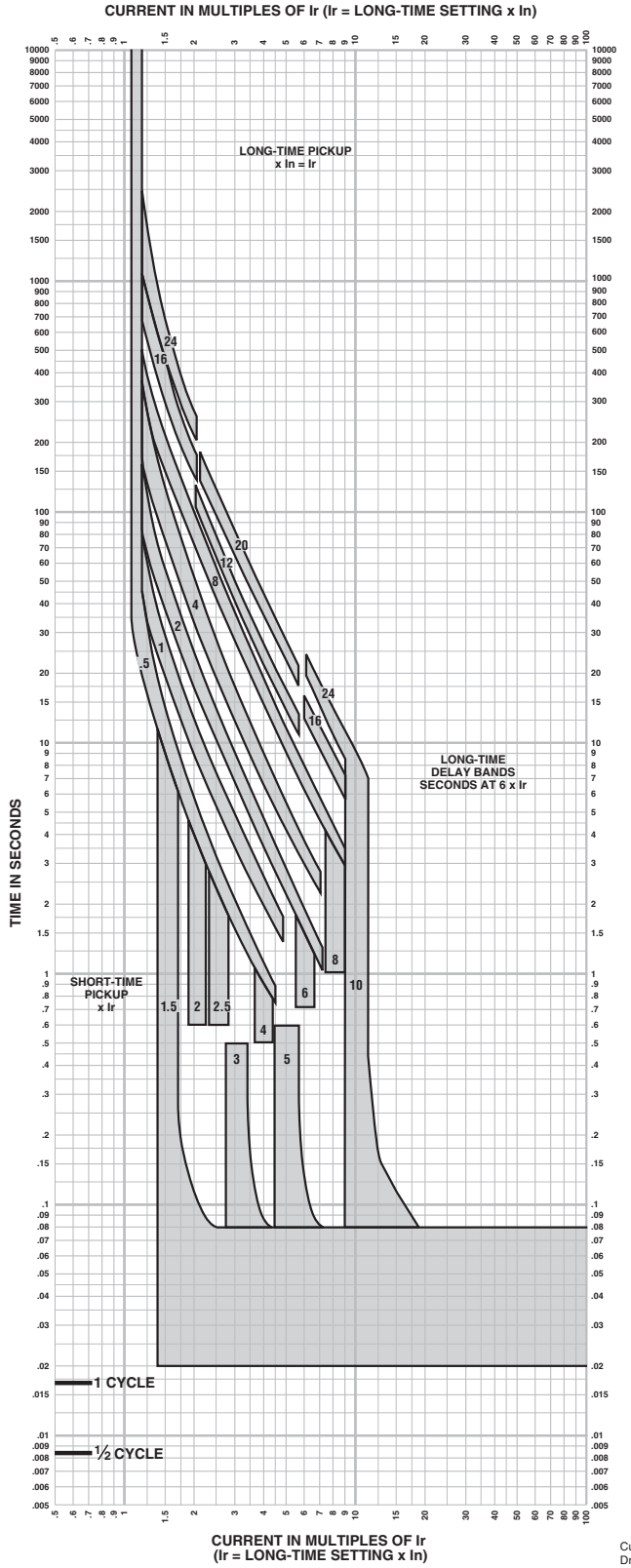
Figure 172: Micrologic 2.0A Trip Unit



Curve No. 0613TC0009
Drawing No. B48095-613-09

Micrologic 2.0A Trip Unit

Characteristic Trip Curve No. 613-9

Long-Time Pickup and Delay
Short-Time Pickup with No Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

NOTE:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the short-time setting.
3. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
4. Overload indicator illuminates at 100%.

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Figure 173: Micrologic 2.0/3.0/5.0/6.0 A/P/H Trip Unit Instantaneous Override Values

INSTANTANEOUS OVERRIDE VALUES NO. 613-10

MASTERPACT NW/NT

ANSI CB Model No.	Inst. Override (kA Peak) +/- 10%
NW08N1 ★	55
NW08N1	None
NW16N1	None
NW08H1 ★	55
NW08H1	None
NW16H1	None
NW20H1	None
NW32H1	None
NW08H2 ★	55
NW08H2	None
NW16H2	None
NW20H2	None
NW32H2	None
NW40H2	None
NW50H2	None
NW60H2	None
NW08H3 ★	55
NW08H3	190
NW16H3	190
NW20H3	190
NW32H3	190
NW40H3	190
NW50H3	190
NW60H3	190
NW08L1 ★	55
NW08L1	80
NW08L1F	55
NW16L1	80
NW16L1F	55
NW20L1	80
NW20L1F	55
NW32L1	270
NW40L1	270
NW50L1	270
NW60L1	270
NW08HA	None
NW16HA	None
NW20HA	None
NW32HA	None
NW40HA	None
NW50HA	None
NW60HA	None
NW08HF	190
NW16HF	190
NW20HF	190
NW32HF	190
NW40HF	190
NW50HF	190
NW60HF	190
NW08HC	80
NW16HC	80
NW20HC	80
NW32HC	270
NW40HC	270
NW50HC	270
NW60HC	270
NT08N1 ★	55
NT08N1	None
NT08H1 ★	55
NT08H1	None
NT08L1F	22
NT08NA	None

MASTERPACT NW/NT

UL CB Model No.	Inst. Override (kA Peak) +/- 10%
NW08N ★	55
NW08N	90
NW12N	90
NW16N	90
NW20N	90
NW08H ★	55
NW08H	90
NW12H	90
NW16H	90
NW20H	90
NW25H	150
NW30H	150
NW40H	170
NW50H	170
NW60H	170
NW08L ★	55
NW08L	80
NW08LF	55
NW12L	80
NW12LF	55
NW16L	80
NW16LF	55
NW20L	150
NW20LF	55
NW25L	150
NW30L	150
NW40L	170
NW50L	170
NW60L	170
NW08HF	90
NW12HF	90
NW16HF	90
NW20HF	90
NW25HF	150
NW30HF	150
NW40HF	170
NW50HF	170
NW60HF	170
NW08HB	80
NW12HB	80
NW16HB	80
NW20HB	150
NW25HB	150
NW30HB	150
NW40HB	170
NW50HB	170
NW60HB	170
NT08N ★	55
NT08N	90
NT12N	90
NT16N	90
NT08H ★	55
NT08H	90
NT12H	90
NT16H	90
NT08L1	22
NT12L1	22
NT16L1	22
NT08L	22
NT08LF	22
NT12L	22
NT16L	22
NT12LF	22
NT08HF	90
NT12HF	90

★ Maximum sensor plug 250 A

MASTERPACT NW/NT

IEC CB Model No.	Inst. Override (kA Peak) +/- 10%
NW08N1	None
NW10N1	None
NW12N1	None
NW16N1	None
NW08H1	None
NW10H1	None
NW12H1	None
NW16H1	None
NW20H1	None
NW25H1	None
NW32H1	None
NW40H1	None
NW40bH1	None
NW50H1	None
NW63H1	None
NW08H2 ★	55
NW08H2	190
NW10H2	190
NW16H2	190
NW20H2	190
NW25H2	190
NW32H2	190
NW40H2	190
NW40bH2	190
NW50H2	270
NW63H2	270
NW20H3	150
NW25H3	150
NW32H3	150
NW40H3	150
NW08L1 ★	55
NW08L1	80
NW10L1	80
NW12L1	80
NW16L1	80
NW20L1	80
NW08H10	None
NW10H10	None
NW12H10	None
NW16H10	None
NW20H10	None
NW25H10	None
NW32H10	None
NW40H10	None
NW08NA	None
NW10NA	None
NW16NA	None
NW08HA	None
NW10HA	None
NW12HA	None
NW16HA	None
NW20HA	None
NW25HA	None
NW32HA	None
NW40HA	None
NW40bHA	None
NW50HA	None
NW63HA	None
NW08HF	190
NW10HF	190
NW12HF	190
NW16HF	190
NW20HF	190
NW25HF	190
NW32HF	190
NW40HF	190
NW08HA10	None
NW10HA10	None
NW12HA10	None
NW16HA10	None
NW20HA10	None
NW25HA10	None
NW32HA10	None
NW40HA10	None
NT08H1	None
NT10H1	None
NT12H1	None
NT16H1	None
NT08L1	22
NT08H10	None
NT10H10	None
NT12H10	None
NT16H10	None
NT08HA	None
NT10HA	None
NT12HA	None
NT16HA	None
NT08HA10	None
NT10HA10	None
NT12HA10	None
NT16HA10	None

POWERPACT / COMPACT

UL/IEC CB Model No.	Inst. Override (kA Peak) +/- 10%
RG600	130
RG800	130
RG1000	130
RG1200	130
RG1600	130
RG2000	130
RG2500	130
RJ600	110▲
RJ800	110▲
RJ1000	110▲
RJ1200	110▲
RJ1600	110▲
RJ2000	110▲
RJ2500	110▲
RK600	130
RK800	130
RK1000	130
RK1200	130
RK1600	130
RK2000	130
RK2500	130
RL600	110▲
RL800	110▲
RL1000	110▲
RL1200	110▲
RL1600	110▲
RL2000	110▲
RL2500	110▲
PG250	55
PG400	55
PG600	55
PG800	55
PG1000	55
PG1200	55
PJ250	15
PJ400	22
PJ600	22
PJ800	22
PJ1000	22
PJ1200	22
PK250	55
PK400	55
PK600	55
PK800	55
PK1000	55
PK1200	55
PL250	15
PL400	22
PL600	22
PL800	22
PL1000	22
PL1200	22

IEC CB Model No.	Inst. Override (kA Peak) +/- 10%
NS800bN	130
NS1000bN	130
NS1250bN	130
NS1600bN	130
NS2000N	130
NS2500N	130
NS3200N	130
NS800bH	110▲
NS1000bH	110▲
NS1250bH	110▲
NS1600bH	110▲
NS2000H	110▲
NS2500H	110▲
NS3200H	110▲
NS630bN	55
NS800N	55
NS1000N	55
NS1250N	55
NS1600N	55
NS630bH	55
NS800H	55
NS1000H	55
NS1250H	55
NS1600H	55
NS630bL	55
NS800L	55
NS1000L	55
NS1250L	55
NS1600L	55

▲ Tolerance +/- 15%

Note:
Faults at or above instantaneous override value will be cleared at 25 msec or less.

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Masterpact™ NW/NT Low Arc Flash Circuit Breakers

Figure 174: Masterpact NW Low Arc Flash Circuit Breaker: L1F and LF

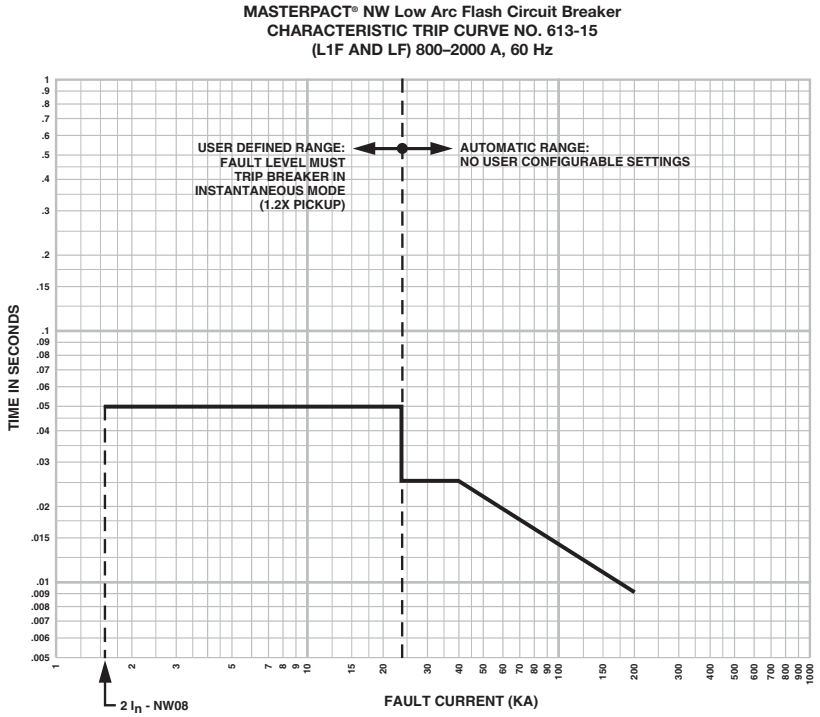
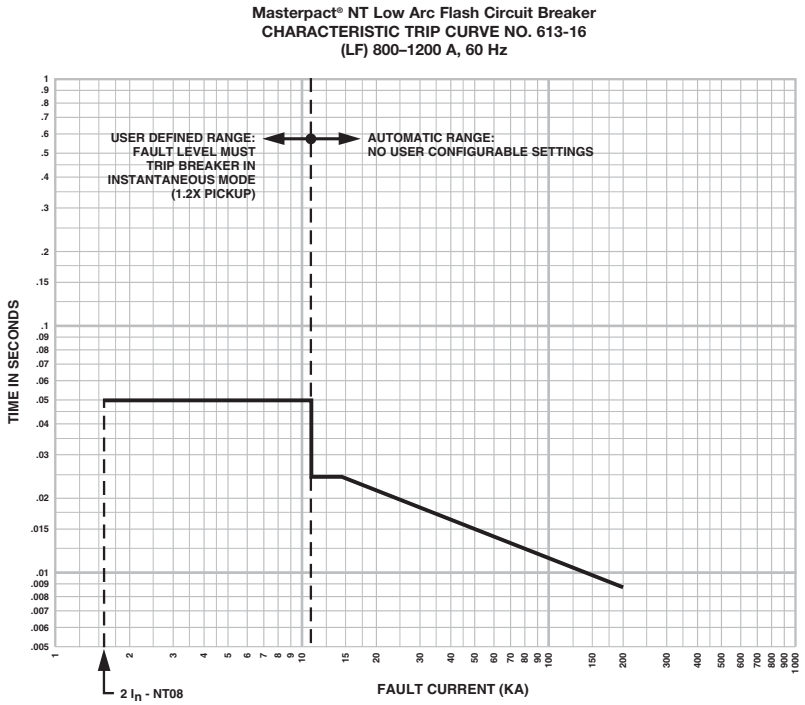


Figure 175: Masterpact NT Low Arc Flash Circuit Breaker: L1F and LF



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